

SD300

GETTING STARTED MANUAL



LOW VOLTAGE VARIABLE SPEED DRIVE

***SD*300**

Variable Speed Drive
Getting Started Manual

Edition: February 2019

SD30IM01GI Rev. G

ABOUT THIS MANUAL

PURPOSE

This manual contains important instructions for the installation and maintenance of Power Electronics SD300 variable speed drives.

AUDIENCE

This manual is intended for qualified customers who will install, operate and maintain Power Electronics SD300 variable speed drives.

Only trained electricians may install and commission the drives.

POWER ELECTRONICS CONTACT INFORMATION

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CONTROL OF REVISIONS		
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15 / 05 / 2017	B	Accessories. Subsidiaries. Misprints corrections
30 / 05 / 2017	C	Technical Characteristics. Mechanical. Installation. Maintenance.
28 / 11 / 2017	D	Safety Instructions, Mechanical Installation, Power Connections, Warning & Fault Messages, Description of Programming Parameters, Modbus Communication, Configuration Register, Declaration of Conformity CE, Contact Information.
14 / 08 / 2018	E	Permanent magnet synchronous motor control. Commonly used configurations.
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SAFETY SYMBOLS

Always follow safety instructions to prevent accidents and potential hazards from occurring.

In this manual, safety messages are classified as follows:



WARNING

Identifies potentially hazardous situations where dangerous voltage may be present, which if not avoided, could result in minor personal injury, serious injury or death

Be extremely careful and follow the instructions to avoid the risk of electrical shocks.



CAUTION

Identifies potentially hazardous situations, which if not avoided, could result in product damage, or minor or moderate personal injury.

Read the message and follow the instructions carefully.



NOTICE

Identifies important measures to take in order to prevent damage equipment and warranty lost, as well as encouraging good use and environmental practices

Other symbols used in this manual for CAUTION messages are the following:



Hot surface. Be careful and follow the instructions to avoid burns and personal injuries.



Risk of fire. Be careful and follow the instructions to prevent causing an unintentional fire.



Caution risk of electric shock. Timed discharge of stored energy. Wait for the indicated time to prevent electrical hazards.



Caution, risk of hearing damage. **Wear hearing protection.**

SAFETY INSTRUCTIONS

IMPORTANT!

Read carefully this manual to maximize the performance of the product and to ensure its safe use.

In order to appropriately use the drive, please, follow all instructions described in the installation manual which refer to transportation, installation, electrical connection and commissioning of the equipment.

Power Electronics accepts no responsibility or liability for partial or total damages resulting from incorrect use of equipment.

Please, pay careful attention to the following recommendations:



WARNING

Do not remove the cover while power supply is connected or the drive is operating. Otherwise, you may get an electric shock.

Do not run the drive with the front cover removed.
Otherwise, you may get an electric shock.

The drive does not remove the voltage from the input terminals. Before working on the drive, isolate the whole drive from the supply.
If you do not remove the power supply, you may get an electric shock.

Do not remove the cover except for periodic inspections or wiring, even if the input power is not applied.
Otherwise, you get an electric shock.

Before opening the covers for wiring or periodic inspections, ensure DC voltage has been fully discharged. Check with a multimeter the following measures:

- Measure between the output power busbars U, V, W and the cabinet and check that the voltage is around 0V.
- Measure that the DC link terminals +, - and chassis voltage are below 30VDC.

Otherwise, you may get an electric shock.

Operate the drive with dry hands.
Otherwise, you may get an electric shock.

Do not use cables with damaged insulation.

Otherwise, you may get an electric shock.

Do not subject the cables to abrasions, excessive stress, heavy loads or pinching. Otherwise, you may get an electric shock.

Do not make any insulation or voltage withstand tests on the motor while the drive is connected.



CAUTION

Install the drive on a non-flammable surface. Do not place flammable material nearby. Otherwise, a fire could occur.



Disconnect the input power if the drive is damaged.

Otherwise, it could result in a secondary accident or fire.

Do not allow lint, paper, wood chips, dust, metallic chips or other foreign matter into the drive. Otherwise, a fire or accident could occur.



The inverter becomes hot during operation. Wait until it cools down before performing any actions.

Touching hot parts may result in skin burns.



Do not apply power to a damaged drive or to a drive with parts missing, even if the installation is complete.

Otherwise, you may get an electric shock.



The equipment contains internal capacitors in the rectification stage. Always check that the capacitors are discharged before performing any maintenance.



NOTICE

RECEPTION

- The SD300 are carefully tested and perfectly packed before delivering.
 - In the event of transport damage, please ensure to notify the transport agency and POWER ELECTRONICS: 902 40 20 70 (International +34 96 136 65 57), or your nearest agent, within 24hrs from receiving the goods.
-

UNPACKING

- Make sure model and serial number of the variable speed drive are the same on the box, delivery note and unit.
 - Each variable speed drive is delivered with Hardware and Software technical manuals.
-

RECYCLING

Equipment packaging must be recycled. Separate all different materials (plastic, paper, cardboard, wood...) and place them in the corresponding containers. Ensure waste collection is properly managed with a Non-Hazardous Waste Agent.



To guarantee health and natural environmental sources protection, the European Union has adopted the WEEE directive concerning discarded electric and electronic equipment (SEEA).

Waste of electrical and electronic equipment (WEEE) must be collected selectively for proper environmental management.

Our products contain electronic cards, capacitors and other electronic devices that should be separated when they are no longer functional. These WEEEs should be managed accordingly with a Hazardous Waste Agent.

Power Electronics promotes good environmental practices and recommends that all its products sold outside of the European Union, once they reach the end of their life, are separated and the WEEE managed according to the particular country applicable legislation (especially: electronic cards, capacitors and other electronic devices)

If you have any questions about the electric and electronic equipment waste, please contact Power Electronics.

ELECTROMAGNETIC COMPATIBILITY (EMC)

- The drive is intended to be used in industrial environments (Second Environment). It achieves compliance with C3 category defined in IEC/EN 61800-3 standard when the installation recommendation within this manual are followed.
 - Select communication and control system according to the drive EMC environment. Otherwise, systems could suffer from interferences due to a low EMS level.
-

SAFETY

Before operating the drive, read this manual thoroughly to gain an understanding of the unit. If any doubt exists, please contact POWER ELECTRONICS, (902 40 20 70 / +34 96 136 65 57) or your nearest agent.

- Wear safety glasses when operating the drive with power applied or for when the front cover is removed.
 - Handle and transport the drive following the recommendations within this manual.
 - Install the drive according to the instructions within this manual and local regulations.
 - Do not place heavy objects on the drive.
 - Ensure that the drive is mounted vertically and keeping the minimum clearance distances.
 - Do not drop the drive or subject it to impact.
 - The SD300 drives contain static sensitive printed circuits boards. Use static safety procedures when handling these boards.
 - Avoid installing the drive under conditions that differ from those described in the Environmental Ratings section.
-

CONNECTION PRECAUTIONS

- To ensure a correct operation of the drive, it is recommended to use a **SCREENED CABLE** for the control wiring.
 - The motor cable should comply with the requirements within this manual. Due to increased leakage capacitance between conductors, the external ground fault protection threshold value should be adjusted ad hoc.
 - Do not disconnect motor cables if the input power supply remains connected.
 - The internal circuits of the SD300 Series will be damaged if the incoming power is connected and applied to the output terminals (U, V, W).
 - Do not use power factor correction capacitor banks, surge suppressors, or RFI filters on the output side of the drive. Doing so may damage these components.
 - Before wiring the terminals, make sure that the inverter keypad display is turned off and the front cover is off as well. The inverter may hold a high voltage electric charge long after the power supply has been turned off.
-

EARTH CONNECTION

- The drive is a high frequency switching device; therefore, leakage current may flow. Ground the drive to avoid electric shock. Use caution to prevent the possibility of personal injury.
 - Connect the input PE terminal only to the dedicated PE terminal of the drive. Do not use the case, nor chassis screws for grounding.
 - Ground the drive chassis through the labelled terminals. Use appropriate conductors to comply with local regulations. The ground conductor should be connected first and removed last.
 - Motor ground cable must be connected to the PE output terminal of the drive and not to the installation's ground. We recommend that the section of the ground conductor (PE) is equal or greater than the active conductor (U, V, W).
-

TRIAL RUN

- Verify all parameters before operating the drive. Alteration of parameters may be required depending on application and load.
 - Always apply voltage and current signals to each terminal that are within the levels indicated in this manual. Otherwise, damage to the drive may occur.
-

CAPACITORS DEPLETION

If the drive has not been operated for a long time, capacitors lose their charging characteristics and are depleted. To prevent depletion, once a year run the device under no-load conditions during 30-60 minutes.

CYBER SECURITY DISCLAIMER

This product is designed to be connected to and to communicate information and data via a network interface. The customer is the sole responsible for providing and continuously ensuring a secure connection between the product and customer network or any other network (as the case may be). Customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Power Electronics and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

INTRODUCTION

1

The SD300 is a high-performance general purpose AC driver. It excels in demanding heavy-duty applications that require high starting torque and precise control. The dual duty rating of the IP20 models ensures compatibility with all normal duty loads. The IP66/NEMA4X models guarantee operation even in the most severe environments. The versatile SD300 is ideal for applications in water treatment and irrigation, food and beverage, ventilation systems, materials handling, packaging systems, textiles, plastic, wood processing, in fact, any general-purpose application where apparatus and machinery needs to be automated.

Some of its outstanding features are:

- Easy-to-use, compact and robust product, offering users savings in time and space.
- Space saving design with side by side mounting.
- The overall motor control features and the motor/drive protection functions limit unexpected machine downtime.
- A built-in display with keypad offers programming and operation capabilities. Remote LCD display option.
- Integrated communication port and Modbus protocol allows the SD300 to exchange data for machine/process monitoring, control and preventive maintenance.
- Safe Torque Off (STO) as standard.



CONFIGURATION TABLE & STANDARD RATINGS

2

Configuration Table

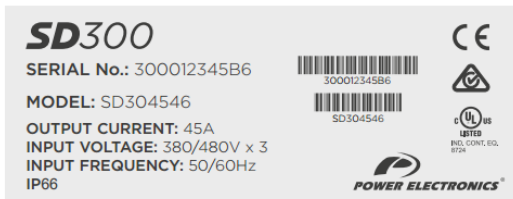
EXAMPLE. CODE: SD305846F

SD3		058		4		6		F	
SERIE		Drive current (Normal Duty) [1]		Drive Voltage		Protection Degree		EMC Filter	
SD3	SD300	002	2A	1	230VAC single-phase	2	IP20	F	Extended
		...		2	230VAC three-phase	6	IP66	-	Standard
		069	69A	4	400VAC three-phase				

[1] Heavy duty for IP66 models.

CODIFICATION EXAMPLES:

- **SD305842F** SD300, 58A, 400Vac three-phase, IP20 degree of protection, EMC extended.
- **SD301212** SD300, 12A, 230Vac single-phase, IP20 degree of protection.
- The following figure shows an example of designation label:



Type designation label (located on lateral panel)

Standard Ratings – 230VAC single-phase

Power ND (kW)	Power HD (kW)	Current ND (A)	Current HD (A)	EMC STANDARD		EMC EXTENDED	
				Model	Frame	Model	Frame
0.75	0.4	3.1	2.5	SD300312	2N	SD300312F ^[1]	1F
1.5	0.75	6.0	5.0	SD300612	3N	SD300612F ^[1]	2F
2.2	1.5	9.6	8.0	SD300912	4N	SD300912F ^[1]	
3.7	2.2	12.0	11.0	SD301212	5N	SD301212F ^[1]	3F

Standard Ratings – 230VAC 3-phase

IP20					
Power ND (kW)	Power HD (kW)	Current ND (A)	Current HD (A)	Model	Frame
0.75	0.4	3.1	2.5	SD300322	1N
1.5	0.75	6.0	5.0	SD300622	2N
2.2	1.5	9.6	8.0	SD300922	3N
4	2.2	12	11	SD301222	4N
5.5	4	18	17	SD301822	5N
7.5	5.5	30	24	SD303022	4
11	7.5	40	32	SD304022	
15	11	56	46	SD305622	5
22	15	69	60	SD306922	6

IP66 (Only HD)			
Power HD (kW)	Current HD (A)	Model	Frame
0.4	2.5	SD300326	1I
0.75	5.0	SD300526	
1.5	8.0	SD300826	2I
2.2	11	SD301126	
4	17	SD301726	3I
5.5	24	SD302426	
7.5	32	SD303226	4I
11	46	SD304626	
15	60	SD306026	5I

[1] EMC class 2

Standard ratings – 400VAC

IP20							
Power ND (kW)	Power HD (kW)	Current ND (A)	Current HD (A)	EMC STANDARD		EMC EXTENDED	
				Model	Frame	Model	Frame
0.75	0.4	2.0	1.3	SD300242	1N	SD300242F ^[2]	1F
1.5	0.75	3.1	2.4	SD300342	2N	SD300342F ^[2]	
2.2	1.5	5.1	4.0	SD300542	3N	SD300542F ^[2]	
4	2.2	6.9	5.5	SD300742	4N	SD300742F ^[2]	2F
5.5	4	10	9.0	SD301042	5N	SD301042F ^[2]	3F
7.5	5.5	16	12	-		SD301642F ^[2]	4
11	7.5	23	16			SD302342F ^[2]	
15	11	30	24			SD303042F ^[2]	5
18.5	15	38	30			SD303842F ^[2]	
22	18.5	44	39			SD304442F ^[2]	6
30	22	58	45			SD305842F ^[2]	

IP66				
Power HD (kW)	Current HD (A)	EMC STANDARD	EMC EXTENDED	Frame
		Model	Model	
0.4	1.3	SD300146	SD300146F ^[2]	1I
0.75	2.4	SD300246	SD300246F ^[2]	
1.5	4.0	SD300446	SD300446F ^[2]	2I
2.2	5.5	SD300646	SD300646F ^[2]	
4	9.0	SD300946	SD300946F ^[2]	3I
5.5	12	SD301246	SD301246F ^[2]	
7.5	16	SD301646	SD301646F ^[2]	4I
11	24	SD302446	SD302446F ^[2]	
15	30	SD303046	SD303046F ^[2]	5I
18.5	39	SD303946	SD303946F ^[2]	
22	45	SD304546	SD304546F ^[2]	

^[2] EMC class 3.

NOTES:

- Maximum applicable capacity is indicated in the case of using a 4-pole standard motor (200 and 400V classes are based on 220 and 440V, respectively).
- For the rated capacity, 200 and 400V class input capacities are based on 220 and 440V, respectively.
- The rated output current is limited depending on the setup of carrier frequency (Cn.4).
- The output voltage becomes 20~40% lower during no-load operations to protect the drive from the impact of the motor closing and opening (0.4~4.0kW models only).
- Dual rating is supported except IP66/NEMA 4X.

TECHNICAL CHARACTERISTICS

3

SD300 SERIES

INPUT	Power ranges	0.4kW – 2.2kW 230V – Single Phase 0.4kW – 22kW 230V – 3-Phase 0.4kW – 30kW 400V – 3-Phase
	Voltage range	230V: 200-240V Single Phase / 3-Phase (-15%/+10%) 400V: 380V-480V 3-Phase (-15%/+10%)
	EMC Filter	C2 ^[1] (First environment) C3 (Second environment)
OUTPUT	Overload capacity	150% for 60sec. (Heavy duty) 120% for 60sec. (Normal duty) ^[2] 200% for 4sec. (Heavy Duty)
	Control Method	V/f, Slip compensation, Sensorless vector, PMSM VC ^[3]
	Frequency Setting Resolution	Digital command: 0.01Hz / Analog command: 0.06Hz (maximum frequency: 60Hz)
	Frequency Accuracy	1% of the maximum output frequency
	V/F Pattern	Linear, Quadratic, User V/F
	Output frequency	0-400Hz (Sensorless: 0-120Hz)
OPERATION	Torque Boost	Manual/Automatic torque boost
	Operation Mode	Keypad / Terminal / Communication option selectable
	Frequency Setting	Analog: -10~10[V], 0~10[V], 4~20[mA] / Digital: Keypad, Pulse train input

[1] Option external RFI filter required

[2] Only available for IP20

[3] Consult with Power Electronics before installing with this type of motors.

SD300 SERIES

	Operation Function		PID control, 3-wire operation, Frequency limit, Second function, Anti-forward and reverse direction rotation, Speed search, Power braking, Leakage reduction, Up-down operation, DC braking, Frequency jump, Slip compensation, Automatic restart, Automatic tuning, Energy buffering, Flux braking, Fire Mode.	
	Input		NPN (Sink) / PNP (Source) Selectable	
			Function: Forward run, Reverse run, Reset, External trip, Emergency stop, Jog operation, Multi-step frequency-high, middle, low, Multi-step acceleration/ deceleration-high, middle, low, DC braking at stop, 2nd motor select, Frequency up/down, 3-wire operation, Change into normal operation during PID operation, Change into main body operation during option operation, Analog command frequency fixing, Acceleration/deceleration stop etc. Selectable	
		Analog Input	V1: -10~10V, selectable V2: 0~10V/I2 4~20mA	
		Pulse Train	0~32kHz, Low level: 0~2.5V, High level: 3.5~12V	
	Output	Open Collector Terminal	Fault output and drive operation status output	Less than DC 24V 50mA
		Multi-function Relay		(N.O., N.C.) less than AC 250V 1A, less than DC 30V 1A
		Analog Output	Selectable 0~12Vdc/0~24mA Frequency, Output current, Output voltage, DC stage voltage etc. selectable	
		Pulse Train	Maximum 32kHz, 10~12 [V]	

SD300 SERIES

PROTECTIVE FUNCTION	Trip	Over current trip, External signal trip, ARM short circuit current trip, Over heat trip, Input imaging trip, Ground trip, Motor over heat trip, I/O board link trip, No motor trip, Parameter writing trip, Emergency stop trip, Command loss trip, External memory error, CPU watchdog trip, Motor normal load trip, Over voltage trip, Temperature sensor trip, Drive over heat, Option trip, Output imaging trip, Drive overload trip, Fan trip, Pre-PID operation failure, External break trip, Low voltage trip during operation, Low voltage trip, Safety A(B) trip, Analog input error, Motor overload trip.
	Alarm	Command loss trip alarm, overload alarm, normal load alarm, drive overload alarm, fan operation alarm, resistance braking rate alarm, number of corrections on rotor tuning error
	Momentary Power Loss	HD below 15ms (ND below 8ms): Continuous operation (To be within rated input voltage, rated output) HD above 15ms (ND above 8ms): Automatic restart operation enable
ENVIRONME NT	Cooling Type	Forced fan cooling structure
	Protection Degree	IP20/UL Open (Default), UL Enclosed Type 1 (Option), IP66/NEMA 4X (Option)
	Ambient Temperature	IP20: HD: -10~50°C (14~122°F) ND: -10~40°C (14~104°F) [However, it is recommended to use load below 80% when using at 50°C under light load]
		IP66: HD: -10~40°C (14~104°F)
	Storage Temperature	-20~65°C (-4~149°F)
	Humidity	Relative humidity below 90% RH (no dew formation)
	Altitude, Vibration	Below 1,000m, below 9.8m/sec ² (1G)
	Location	No corrosive gas, flammable gas, oil mist and dust etc. indoors (Pollution Degree 3 Environment)
	Pressure	70~106 kPa

SD300 SERIES

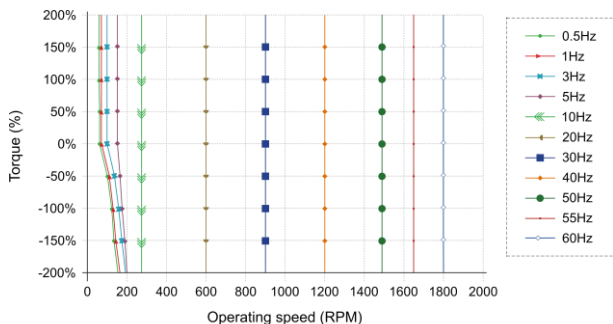
REGULATION S	Global certification	CE, UL, cUL, RoHS
	PCB	3C2 Conformal coating

Enhanced Sensorless Control

Sensorless Control

Starting torque of 200% / 0.5Hz is produced and provides robust power in the low speed region.

The motor auto-tuning function is optimized to maximize motor performance.

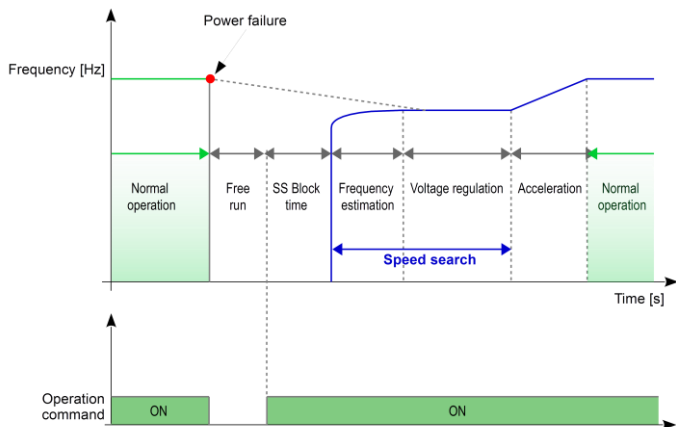


SD30ITCC0002BI

Sensorless control

Flying Start Function

The SD300 is capable of performing quick and reliable smooth restarts. It is equipped with standstill/rotary auto-tuning.



SD30ITCC0003AI

Flying start function

DIMENSIONS

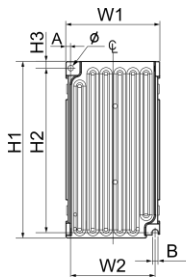
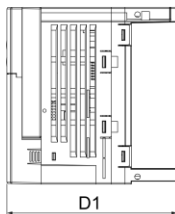
4

IP20 Drives Dimensions

Frame 1N Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	3	SD300322
380~480[V]	3	SD300242

DIMENSIONS [mm/inch]									WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	A	B	Ø	
68 (2.7")	61.1 (2.4")	128 (5")	119 (4.7")	5 (0,2")	128 (4.8")	3.5 (1,4")	4 (0.2")	4.2 (1.65")	0.86 (1.9lb)



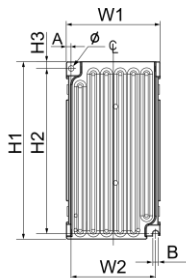
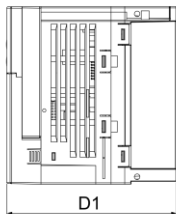
SD30DTD0024A

Frame 1N dimensions

Frame 2N Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	1	SD300312
200~240[V]	3	SD300622
380~480[V]	3	SD300342

DIMENSIONS [mm/inch]									WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	A	B	Ø	
68 (2.7")	61.1 (2.4")	128 (5")	119 (4.7")	5 (0.2")	128 (5")	3.5 (1.4")	4 (0.2")	4.2 (1.65")	0.86 (1.9lb)



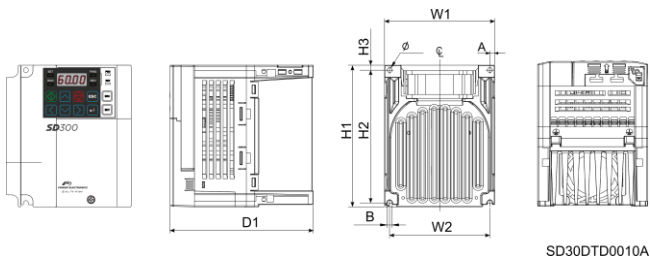
SD30DTD0009A

Frame 2N dimensions

Frame 3N Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	1	SD300612
200~240[V]	3	SD300922
380~480[V]	3	SD300542

DIMENSIONS [mm/inch]									WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	A	B	Ø	
100 (3.9")	91 (9.6")	128 (5")	120 (4.7")	4.5 (0.2")	130 (5.1")	4.5 (0.2")	4.5 (0.2")	4.5 (0.2")	1.5 (3.3lb)

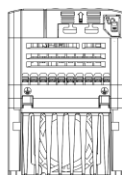
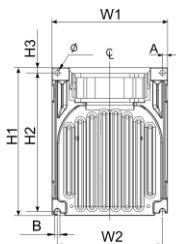
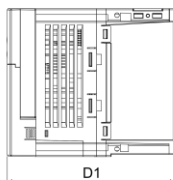


Frame 3N dimensions

Frame 4N Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	1	SD300912
200~240[V]	3	SD301222
380~480[V]	3	SD300742

DIMENSIONS [mm/inch]									WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	A	B	Ø	
100 (3.9")	91 (9.6")	128 (5")	120 (4.7")	4.5 (0.2")	145 (5.7")	4.5 (0.2")	4.5 (0.2")	4.5 (0.2")	1.5 (3.3lb)



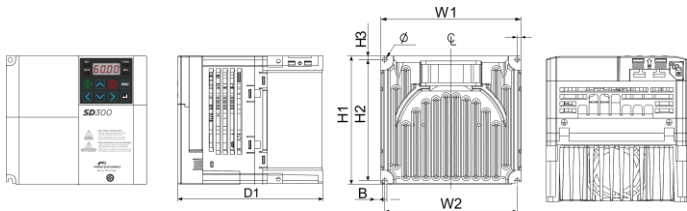
SD300DTD0011A

Frame 4N dimensions

Frame 5N Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	1	SD301212
200~240[V]	3	SD301822
380~480[V]	3	SD301042

DIMENSIONS [mm/inch]									WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	A	B	Ø	
140 (5.5")	132.2 (5.2")	128 (5")	120.7 (4.8")	3.7 (0.1")	145 (5.7")	3.9 (0.2")	4.4 (0.2")	4.5 (0.2")	2.7 (6lb)



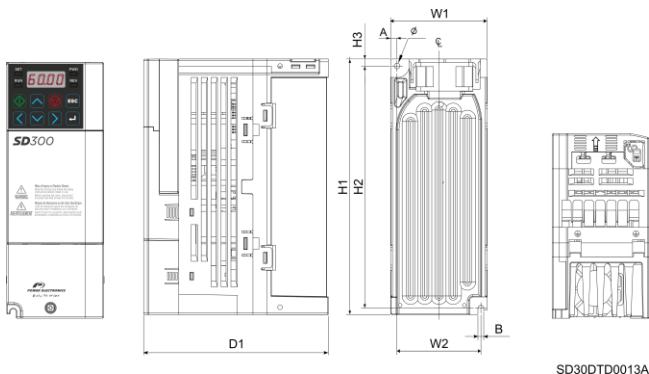
SD300TD0012A

Frame 5N dimensions

Frame 1F Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	1	SD300312F
380~480[V]	3	SD300242F, SD300342F

DIMENSIONS [mm/inch]									WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	A	B	Ø	
68 (2.7")	59 (2.3")	180(7.1 ")	170.5 (6.7")	5 (0.2")	130 (5.1")	4.5 (0.2")	4.5 (0.2")	4.2 (0.2")	1.2 (2.6lb)

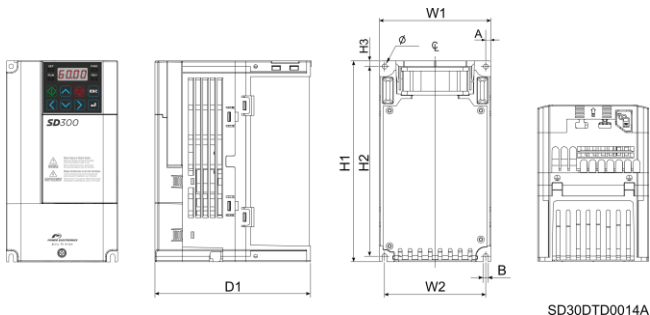


Frame 1F dimensions

Frame 2F Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	1	SD300612F, SD300912F
380~480[V]	3	SD300542F, SD300742F

DIMENSIONS [mm/inch]									WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	A	B	Ø	
100 (3.9")	91 (3.6")	180 (7.1")	170 (6.7")	5 (0.2")	140 (5.5")	4.5 (0.2")	4.5 (0.2")	4.2 (0.2")	1.8 (4lb)

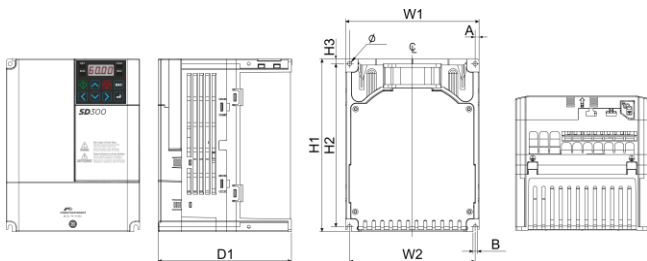


Frame 2F dimensions

Frame 3F Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	1	SD301212F
380~480[V]	3	SD301042F

DIMENSIONS [mm/inch]									WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	A	B	Ø	
140 (5.5")	132 (5.2")	180 (7.1")	170 (6.7")	5 (0.2")	140 (5.5")	4 (0.2")	4 (0.2")	4.2 (0.2")	2.2 (4.9lb)



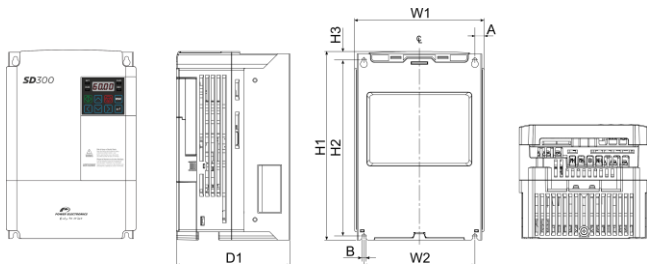
SD300TD0015A

Frame 3F dimensions

Frame 4 Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	3	SD303022, SD304022
380~480[V]	3	SD301642F, SD302342F

DIMENSIONS [mm/inch]									WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	A	B	Ø	
160 (6.3")	137 (5.4")	232 (9.1")	216.5 (8.5")	10.5 (0.4")	140 (5.5")	5 (0.2")	5 (0.2")	-	3.3 (7.3lb)



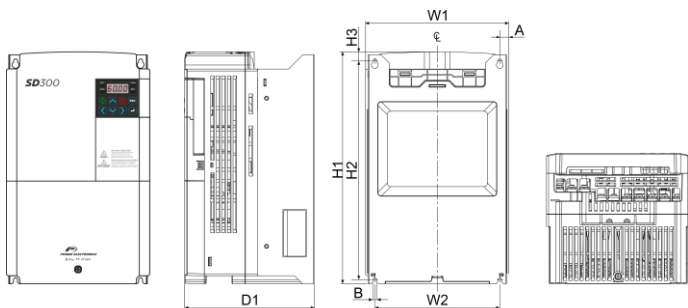
SD300TD0021A

Frame 4 dimensions

Frame 5 Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	3	SD305622
380~480[V]	3	SD303042F, SD303842F

DIMENSIONS [mm/inch]									WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	A	B	Ø	
180 (7.1")	157 (6.2")	290 (11.4")	274 (10.8")	11.3 (0.4")	163 (6.4")	5 (0.2")	5 (0.2")	--	4.8 (10.6lb)



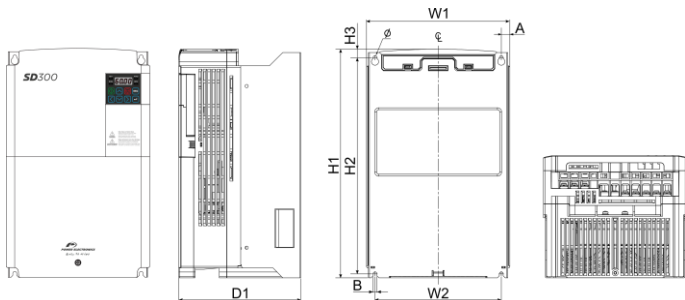
SD30DTD0022A

Frame 5 dimensions

Frame 6 Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	2	SD306922
380~480[V]	3	SD304442F, SD305842F

DIMENSIONS [mm/inch]									WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	A	B	Ø	
220 (8.7")	193.8 (7.6")	350 (13.8")	331 (13")	13 (0.5")	187 (7.4")	6 (0.2")	6 (0.2")	-	7.5 (15.4lb)



SD300TD0023A

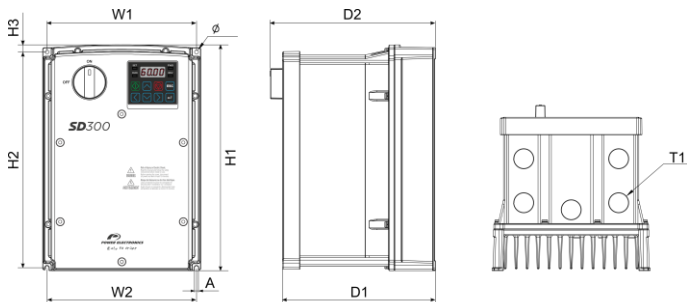
Frame 6 dimensions

IP66 Drives Dimensions

Frame 1I Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	3	SD300326, SD300526
380~480[V]	3	SD300146F, SD300246F

DIMENSIONS [mm/inch]											WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	D2	A	Ø	T1	T2	
180 (7.1")	170 (6.7")	257 (10")	245 (9.6")	8.2 (0.3")	174 (6.9")	188 (7.4")	4.5 (0.2")	4.5 (0.2")	22.3 (0.9")	-	3.7 (8.2lb)



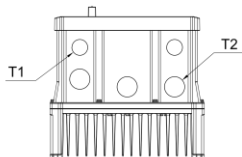
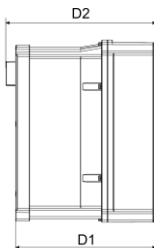
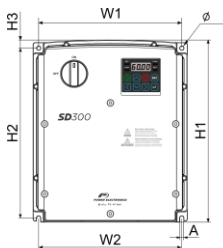
SD300TD0016A

Frame 1I dimensions

Frame 2I Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	3	SD300826, SD301126, SD301726
380~480[V]	3	SD300446F, SD300646F, SD300946F

DIMENSIONS [mm/inch]											WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	D2	A	Ø	T1	T2	
220 (8.7")	204 (8")	259 (10")	241 (9.5")	12 (0.5")	201 (7.9")	215 (8.5")	5.5 (0.2")	5.5 (0.2")	22.3 (0.9")	28.6 (1.1")	5.3 (12lb)



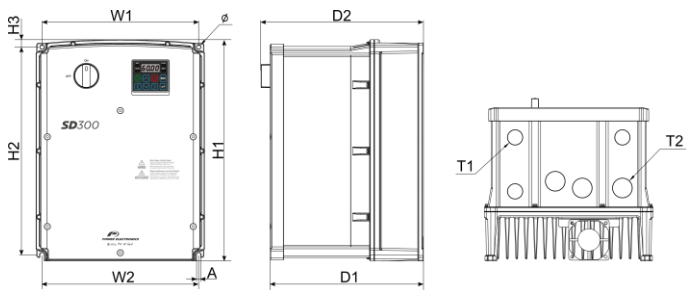
SD30DTD0017A

Frame 2I dimensions

Frame 3I Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	3	SD302426, SD303226
380~480[V]	3	SD301246F, SD301646F

DIMENSIONS [mm/inch]											WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	D2	A	Ø	T1	T2	
250 (9.8")	232 (9.1")	328 (13")	308 (12")	11 (0.4)	227 (8.9")	241 (9.5")	6 (0.2")	6 (0.2")	22.3 (0.9")	28.6 (1.1")	9 (19.8lb)



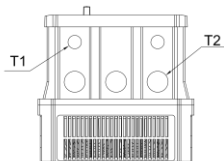
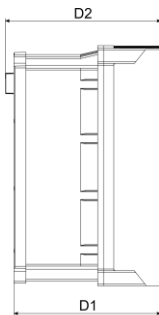
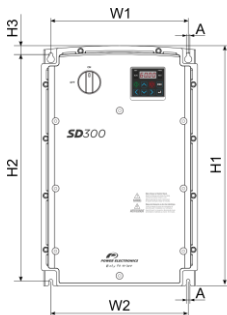
SD30DTD0018A

Frame 3I dimensions

Frame 4I Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	3	SD304626
380~480[V]	3	SD302446F, SD303046F

DIMENSIONS [mm/inch]											WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	D2	A	Ø	T1	T2	
260 (10")	229 (9")	400 (16")	377 (15")	15 (0.6")	246 (9.7")	260 (10")	6 (0.2")	-	22.3 (0.9")	34.9 (1.4")	9.6 (21lb)



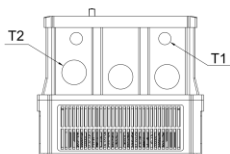
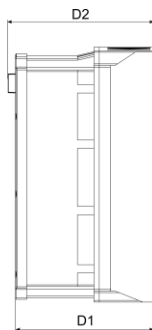
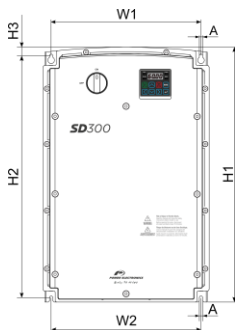
SD300TD0019A

Frame 4I dimensions

Frame 5I Dimensions

INPUT VOLTAGE	PHASES	EQUIPMENT
200~240[V]	3	SD306026
380~480[V]	3	SD303946F, SD304546F

DIMENSIONS [mm/inch]											WEIGHT (kg/lb)
W1	W2	H1	H2	H3	D1	D2	A	Ø	T1	T2	
300 (12")	271 (10")	460 (18")	437 (17")	16 (0.6")	250 (9.8")	264 (10")	6 (0.2")	-	22.3 (0.9")	44.5 (1.8")	12.4 (28lb)



SD30DTD0020A

Frame 5I dimensions

RECEPTION, HANDLING AND TRANSPORTATION

5

CAUTION

Read carefully the following instructions to ensure correct mechanical installation.

Otherwise, the equipment can be damaged and lead to personal injuries.

Reception and Storage

The SD300 is carefully tested and perfectly packed before delivery. In the event of transport damage, please ensure that you notify the transport agency and Power Electronics: 902 40 20 70 (International +34 96 136 65 57) or your nearest agent, within 24hrs from receipt of the goods.

Make sure model and serial number of the drive are the same on the delivery note and unit.

Drive should be stored in a sun and moisture protected space and with an ambient temperature between -20°C and $+65^{\circ}\text{C}$, < 95 RH without condensation. It is recommended not stacking more than two units.

Handling and Transportation

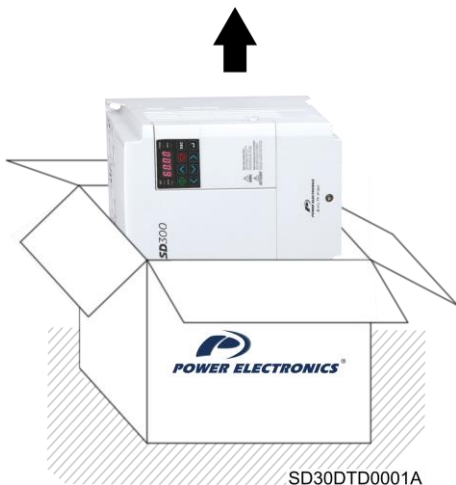


CAUTION

Handle the equipment carefully. Otherwise, the equipment can get damaged.

SD300 is delivered horizontally in a cardboard box. Unpack the drive carefully. Do not use sharp tools as they could damage the product. After opening the package, please check the contained goods. Verify the item numbers contained within the package with the packing inventory list. Please

remove and set aside any spare parts shipped with the product. There should be no evident damage caused by vibration, dropping or moisture.



Drive unpacking

To unpack, carefully extract the drive from the box. The drive is packed with its frontal side facing up. Remove and place in its vertical standing position.

MECHANICAL INSTALLATION

6



CAUTION

The installation must be carried out by qualified personnel.

Otherwise, the equipment can get damaged and injuries could be sustained.

Before the installation, make sure the chosen location is suitable.

There must be enough space to fit the drive meeting the recommended clearances and ensuring that there are no obstacles impeding the cooling fans air flow.

Environmental Ratings

Power Electronics recommends following closely the instructions stated within this manual to ensure the correct operation of the drive. It is responsibility of the installer to ensure correct installation and suitable ambient conditions for the VFD. Additionally, any local regulations must be adhered to by the installer. The environmental ratings are:

- Environmental category: Indoor / Outdoor
- Pollution degree: PD3
- Cooling type: Forced fan cooling structure. Forced cooling type: 0.4~15 kW 200V/0.4~75 kW 400V (excluding some models)
- Operation Ambient temperature: HD IP20: -10~50°C (14~122°F)
HD IP66: -10~40°C (14~104°F)
ND: -10~40°C (14~104°F) ^[1]
No cold, no frost.
- Storage Ambient temperature: -20~65°C (-4~149°F)
- Humidity: Relative humidity below 90% RH (no dew formation)
- Altitude / Vibration: Below 1,000m, below 9.8m/s² (1G)
- Pressure: 70~106 kPa

[1] Power Electronics recommends to use load below 80% when using at 50°C under light load.

Drive Mounting

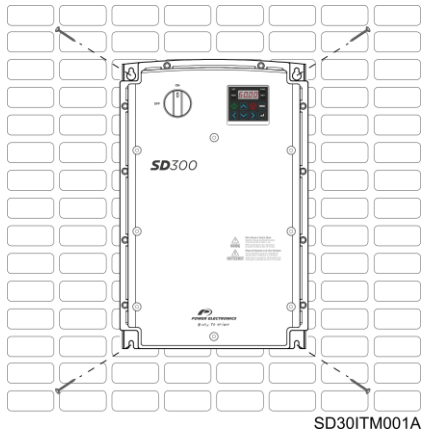
The SD300 variable speed drives are designed to be mounted on a wall or inside a panel.

The inverter can become very hot during operation. Install the inverter on a surface that is fire-resistant or flame-retardant and with sufficient clearance around the inverter to allow air to circulate. Make sure to follow the clearance recommendations in “Clearances” section.

Hang the SD300 drive through the anchorages placed on the rear part of the drive on a solid wall or structure which supports the drive weight and the possible forces generated by the wiring.

Use a level to draw a horizontal line on the mounting surface and mark the fixing points. Then, drill the two upper mounting bolt holes, and then install the mounting bolts. Do not fully tighten the bolts yet.

Mount the drive using the two upper bolts, and then fully tighten the mounting bolts. Ensure that the SD300 is placed flat on the mounting surface.



SD300 wall mounting

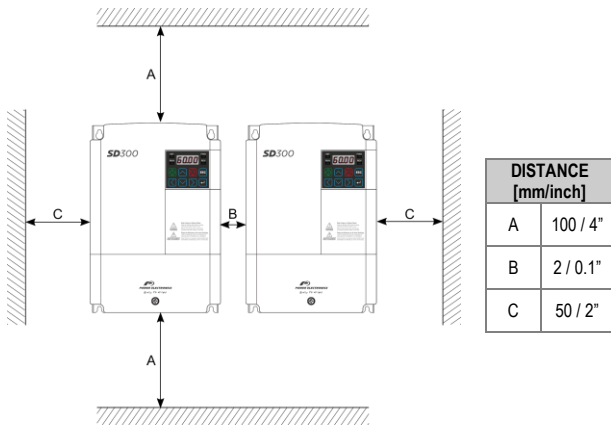
Note: The quantity and dimensions of the mounting brackets vary based on frame size. Please refer to “DIMENSIONS” section to find the information that corresponds to your model.

There is an optional flange for special installations. If you have ordered this option, please refer to “Flange Type” section for installation instructions.

Clearances

The SD300 VFD must be installed in vertical position, and firmly fastened through the dedicated anchorages placed in the rear part of the drive that avoid any movement.

If the equipment is installed inside a cabinet, ensure that the hot air expelled from the VFD flows outside. This hot air can recirculate, and cause the drive to suffer from overheating. To guarantee a suitable ambient temperature, avoid the recirculation of air and follow the minimum clearance distances, as indicated below.



SD300DT0001B

Minimum clearances

If you wish to install two or more drives in a technical room or cabinet, mount them side by side in a horizontal arrangement (do not stack one on top of the other), it is necessary to remove the top cover using a screwdriver and respect the minimum clearances in order to ensure proper cooling of the product.



Installing multiple drives



NOTICE

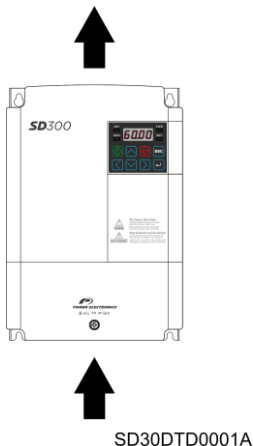
Remove the top cover of the drives when they are mounted in a horizontal arrangement.

Otherwise, the equipment can get damaged and the warranty will be voided.

Cooling

The heat sources inside the equipment correspond to the inverter bridge (IGBTs), rectifier bridge and the input filter.

The drive has at least one cooling fan (this varies depending on the drive size) at the bottom, the hot air is then dissipated through the gratings on the top side.



Cooling airflow for SD300

It is possible to replace the cooling fans without dismounting the whole equipment. To do this, unscrew the screws in the fan corners and disconnect the connector.



NOTICE

Ensure that the technical room or cabinet has good air flow, considering that hot air cannot be recirculated by the drive.

Fan Air Flow

EXAMPLE. CODE: 3N Frame; 1,5kW-4

3	N		1,5 kW	-4	
Frame	Filter		Power	Voltage	
1	N	No filter type	0,4 kW	-1	230VAC monophase
...	F	Filter type	...	-2	230VAC three-phase
6			22 kW	-4	400VAC

- Air Flow: 2N Frame / 3N Frame / 1F Frame.**

2N Frame	3N Frame	1F Frame
0,4kW-1	0,8kW-1	0,4kW-1
0,4/0,8kW-2	1,5kW-2	0,4/0,8kW-2
0,4/0,8kW-4	1,5kW-4	0,4/0,8kW-4

Air flow	Max Air Flow [m3/min]	Average	0,31
		Minimum	0,28

- Air Flow: 4N Frame / 5N Frame / 2F Frame / 3F Frame.**

4N Frame	5N Frame	2F Frame	3F Frame
1,5kW-1	2,2kW-1	0,8/1,5kW-1	2,2kW-1
2,2kW-2	3,7/4,0kW-2	1,5/2,2kW-2	3,7/4,0kW-2
2,2kW-4	3,7/4,0kW-4	1,5/2,2kW-4	3,7/4,0kW-4

Air flow	Max Air Flow [m3/min]	Average	0,66
		Minimum	0,64

- Air Flow: 4 Frame.**

4 Frame
5,5/7,5kW-2
5,5/7,5kW-4

Air flow	Max Air Flow [m3/min]	0,98 (34,6 CFM)
-----------------	------------------------------	-----------------

- Air Flow: 5 Frame.**

5 Frame
11kW-2
11/15kW-4

Air Flow [m3/min]	Min.	1,45
	Rated	1,55

- Air Flow: 6 Frame.**

6 Frame
15kW-2
18,5/22kW-4

Air Flow [m3/min]	Min.	2,85
	Rated	3,15

POWER CONNECTIONS

7



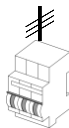
CAUTION

Read carefully the following instructions to ensure correct electrical installation.

Otherwise, the equipment could get damaged and lead to personal injuries.

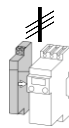
Basic Configuration

Appropriate safety equipment must be used and the unit properly connected in order to guarantee correct operation. A drive which is incorrectly installed or set up can result in system malfunction, component damage or a reduced lifespan. You must read this manual thoroughly before proceeding.



AC Power
Supply

Use a power supply with a voltage range compatible with the selected drive. SD300 drives are available for TN and TT grids, or IT grids (floating earth). Check the serial number to ensure the correct drive selection.



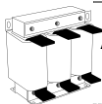
Circuit Breaker

Select circuit breakers or fuses in accordance with applicable national and local codes. We recommend using specified circuit breakers or fuses to operate with the drive.






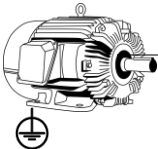
Magnetic
contactor
(optional)

Install if necessary. When installed, do not use it for the purpose of starting or stopping the drive.



AC reactor
(optional)

Use an AC reactor if you wish to improve the input power factor of the power supply, reduce harmonics or suppress external surges.

	SD300 Installation	Install the drive following the recommendation within this manual in relation with the cooling requirements, position, clearances, wiring access and ground connection.
	DC reactor (optional)	DC reactors also contribute to improving the power factor and harmonics reduction, but DC reactors are usually used in facilities with higher power supply capacity.
	Motor cables	Select and install the motor cables according to the recommendation within this manual and the applicable national and local codes, otherwise you could cause EMC filtering malfunction and motor damage.
	Motor	Do not connect power factor capacitors, surge arrestors or RFI filters to the output side of the drive.

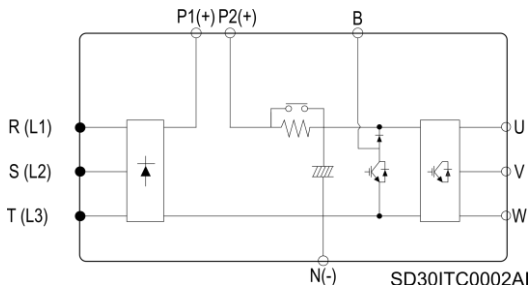
Topology

SD300 drive operates according to the principle of pulse-width modulation (PWM). By varying the power supply voltage and the grid frequency, it is possible to control the speed and torque of the connected induction three-phase motors by means of its main components: rectifier bridge, the DC bus, inverter bridge, and power and control board.

The SD300 includes a gate drive and a control board to control the rectifier thyristor diode's bridge triggering, the inverter IGBT's bridge triggering, the soft charge, the DC bus voltage and the motor performance. In addition, the control board integrates the interface terminals such as communication ports, the digital and analogue inputs and outputs, display, etc.

Power Terminals

The available power terminals are shown in the figure below. For the power connection, check section “Recommended Cable”.

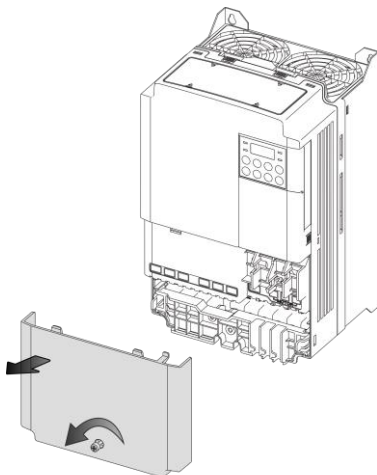


Location of terminals in the control board

	SIGNAL	DESCRIPTION
DC REACTOR	P1(+)	Connection terminal for DC reactor
	P2(+)	Harmonic mitigation
DYNAMIC BRAKE	N(-)	DC voltage negative terminal
	B	Integrated dynamic brake unit
POWER SUPPLY	R(L1)	AC Line Voltage input
	S(L2)	(3-phase, AC 200 ~ 230V)
	T(L3)	(3-phase, AC 380 ~ 480V)
MOTOR OUTPUT	U	Motor connection terminals
	V	(3-phase, AC 200 ~ 230V)
	W	(3-phase, AC 380 ~ 480V)

Power Terminals - IP20

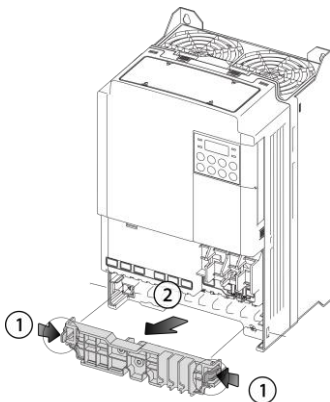
To access the power terminals, users have to unscrew the bottom cover as follows:



SD30ITM0017A

Bottom cover removal – IP20

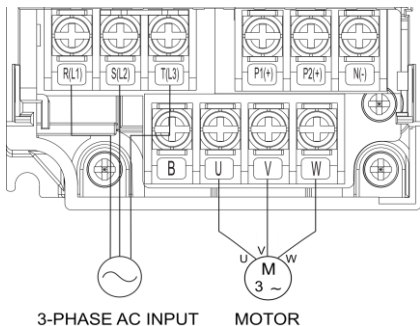
Then, remove the power terminals plastic protection pushing sides clips as shown in the following image:



SD30ITM0018A

Plastic protection removal

Power terminals for each frame:

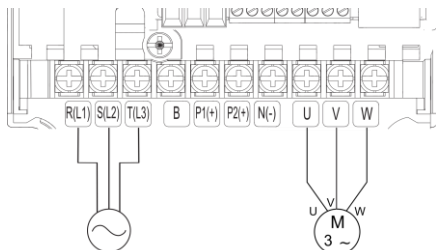


3-PHASE AC INPUT

MOTOR

SD30DTP0004AI

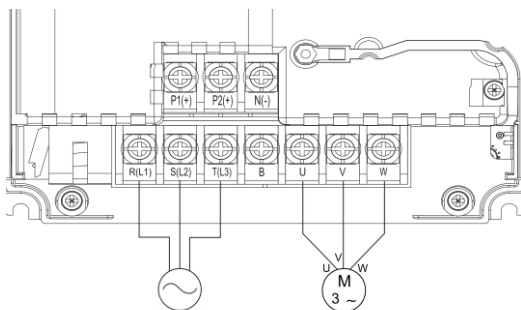
Power terminals in frames 1N, 2N & 1F



3-PHASE AC INPUT

MOTOR

SD30DTP0005AI

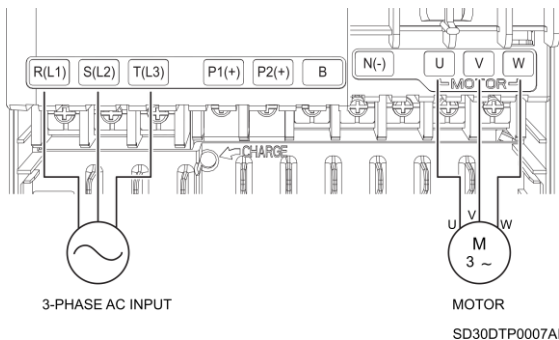
Power terminals in frames 3N, 4N & 2F

3-PHASE AC INPUT

MOTOR

SD30DTP0006AI

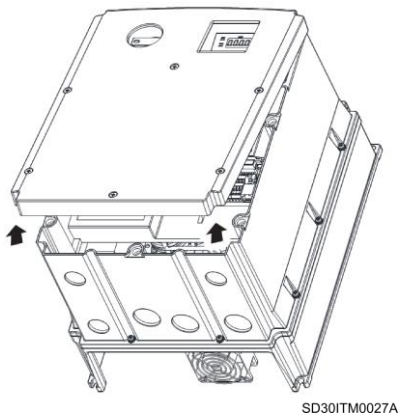
Power terminals in frames 5N & 3F



Power terminals in frames 4, 5 & 6

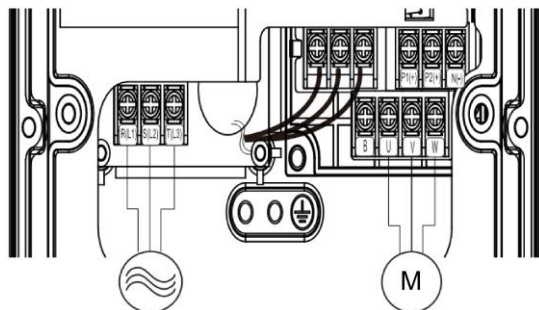
Power Terminals – IP66

To access the power terminals, users have to unscrew the front cover and take it out as follows:



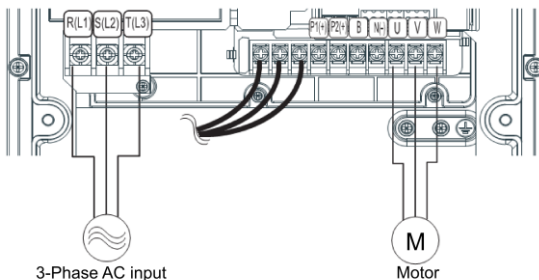
Cover removal – IP66

Power terminals for each frame:



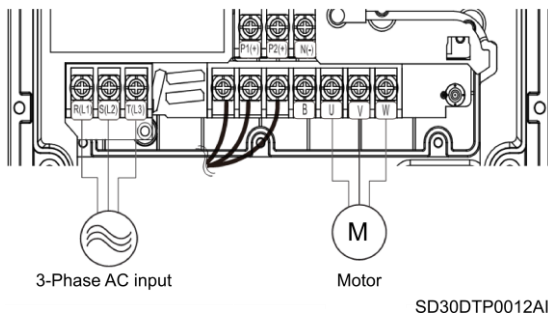
SD30DTP0010AI

Power terminals in frame 11

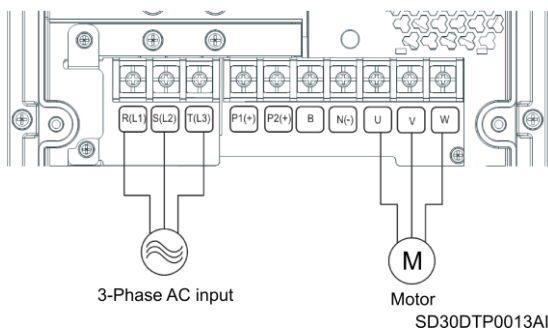


SD30DTP0011AI

Power terminals in frame 21 – models SD300446 y SD300646



Power terminals in frame 2I – model SD300946



Power terminals in frames 3I - 4I - 5I

Power Connection and Wiring



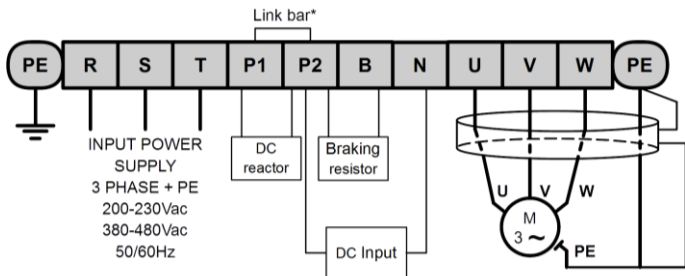
CAUTION

The following installation recommendations are suitable for TN and TT grids. For IT grids, consult Power Electronics. Otherwise, the equipment could be damaged and the risk of injury heightened.

Any wiring or periodic inspections should be performed at least 10 minutes after disconnecting the input power. To remove the front cover, first check that the DC Link red LED is off, then remove the metallic cover and check with a multimeter the following:

- Measure between the output power busbars U, V, W and the cabinet and check that the voltage is around 0V.
 - Measure that the DC link terminals +, - and chassis voltage are below 30VDC.
- Otherwise, you may get an electric shock.

The user input and output busbars are labelled according to the following diagram.



Motor cable shield should be connected to the drive and, additionally, to the general earth of the installation.

(*) The link bar should be removed when wiring the DC reactor.

SD30DTP0001AI

Power wiring connection

As standard, the input and output terminals are made of tin plated copper. If they are oxidized prior to its installation, the terminals will be poorly connected and this is a cause of overheating. To avoid this effect, clean the terminal lugs and all contact surfaces with ethanol and follow the recommended cable section.

Use insulated ring lugs when connecting the power terminals.



CAUTION

Line voltage (input supply) must never be connected to U, V and W terminals.

Incorrect connection will result in the drive being damaged.

It is necessary that the installer guarantees the correct observance of the law and the regulations that are in force in those countries or areas where this device is going to be installed.

Do not use capacitors for power factor correction, surge suppressors, or RFI filters on the output side of the drive. In doing so, the components could get damaged.

Use shielded and three-wire braided cable and ground. Do not use single-core wires.

If the drive settings are set by default (switching frequency 3 kHz), make sure that the total cable length does not exceed:

- 100 m (328ft) for unshielded wires.
- 50m (165ft) for shielded wires.

For other switching frequencies, lengths may vary.

Voltage drop is calculated by using the following formula:

Voltage Drop (V) = $[\sqrt{3} \times \text{cable resistance (m}\Omega/\text{m)} \times \text{cable length (m)} \times \text{current(A)}] / 1000$

The allowed carrier frequency is:

Distance	< 50m (165ft)	< 100m (330ft)	> 100m (330ft)
Allowed carrier frequency	< 15kHz	< 5kHz	< 2.5kHz

The power cables must have a sufficient power rating in order to prevent overheating and voltage drops. The installer must consider the cable cross-section, cable type, routing method and the ambient conditions to select the appropriate cable. It is only permitted the use of copper or aluminum cables.



NOTICE

Do not exceed the motor cable distances. Longer cables can cause reduced motor torque in low frequency applications due to the voltage drop, increase circuit susceptibility to stray capacitance which may trigger over-current protection devices or result in a malfunction of the equipment connected to the drive.

Recommended Cable Section

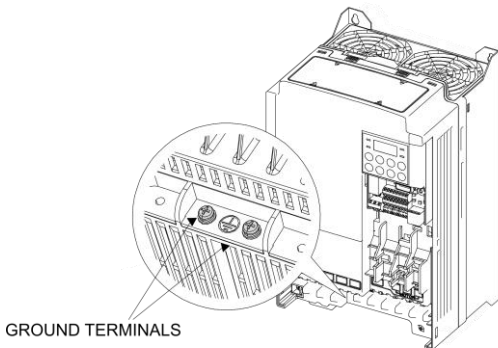
Model		Screw	Torque ^[1] [Kg ^f * cm / Nm]	Wire ^[2]							
				mm ²		AWG					
				R, S, T	U, V, W	R, S, T	U, V, W				
230V 1-phase	0.4 kW	M3.5 (1/8")	2.1 ~ 6.1 / 0.2 ~ 0.6	2	2	14	14				
	0.75 kW										
	1.5 kW	M4 (1/8")		3.5	3.5	12	12				
	2.2 kW										
230V 3-phase	0.4 kW	M3.5 (1/8")		2	2	14	14				
	0.75 kW										
	1.5 kW										
	2.2 kW										
	3.7 kW	M4 (1/8")		3.5	3.5	12	12				
	4 kW										
	5.5 kW										
	7.5 kW										
	11 kW										
15 kW	M5 (3/16")	4.0 ~ 10.2 / 0.4 ~ 1.0	10	10	8	8					
			16	16	6	6					
400V 3-phase	0.4 kW	M3.5 (1/8")	2.1 ~ 6.1 / 0.2 ~ 0.6	2	2	14	14				
	0.75 kW										
	1.5 kW										
	2.2 kW										
	3.7 kW	M4 (1/8")						2.5	2.5	14	14
	4 kW										
	5.5 kW										
	7.5 kW										
	11 kW										
	15 kW	M5 (3/16")	4.0 ~ 10.2 / 0.4 ~ 1.0	6	6	10	10				
	18.5 kW										
	22 kW										

[1] Use only the specified torque on the screws, otherwise damage could occur. Loose screws can cause overheating and damage.

[2] Wires must permanently support 600V and T^a >75°C.

Ground Connection

Before connecting the power conductors, make sure that the chassis of the drive and the adjoining cabinets are connected to ground through the dedicated (PE) terminals. The PE terminals are located in the bottom part of the drive and labelled with the appropriate ground connection.



SD30DTP0003AI

PE terminals location

Motor chassis grounding must be connected to the drive. In other words, connect the motor's ground conductor to the PE output terminal of the drive and not to the installation's ground. We recommend that the cross section of the motor's ground conductor (PE) should have at least the cross section of the active conductor (U, V, W). Additionally, it should be installed following the recommendations indicated in previous sub-section.

When connecting the earth, ensure that all connected terminal lugs are securely tightened and protected from mechanical forces. Check the recommended tightening torque in "Recommended Cable" table, from this section.



WARNING

For safety reasons, it is essential to measure the grounding resistance of the installation. This must be established before the first start up of the plant and with the drive disconnected.

The installer is responsible of providing the adequate amount, type and cross section grounding conductor alongside the characteristics of the drive used and the plant, in order to minimize the grounding resistance, which must comply with local and national regulations.

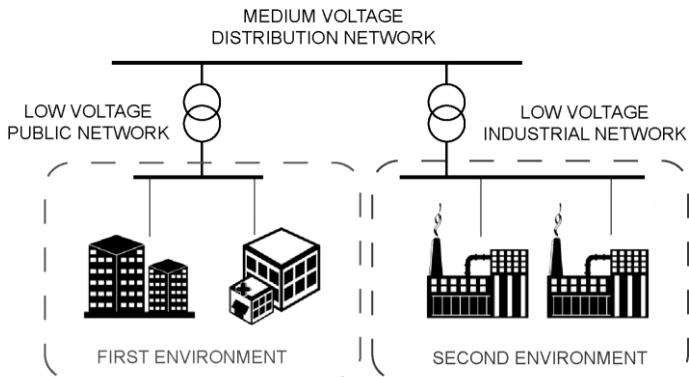
EMC Installation Requirements

Introduction

The EMC European Directive defines electromagnetic compatibility as the capability of an apparatus, an industrial plant, or a system to work satisfactorily in the electromagnetic environment, without at the same time causing electromagnetic disturbances in the apparatus, industrial plant or systems present in the same environment.

The Electromagnetic Compatibility (EMC) depends on two main characteristics of the equipment: Electromagnetic Interference (EMI) and Electromagnetic Susceptibility (EMS). The EMC standards aims to ensure that all the electrical equipment that could operate simultaneously in the same environment are compatible. This means that the interference immunity of all the devices is greater than the interference emission of all the devices within the same environment.

The EMC requirements for Power Drive System (PDS) are defined in IEC/EN 61800-3 standard that is included in the Declaration of conformity CE enclosed. In the European Union, EN61800-3 standard takes priority over all generic standards. The PDS in the context of this standard comprises the drive converter, the motor cables and the motor. Therefore, the installer as the ultimate responsible must follow the installation instructions given within this manual.



GITG0006AI

Depending on the location of the drive, the standards define four categories distributed in two environments.

- First Environment: Domestic installations. It also includes premises directly connected to a low-voltage power supply network without an intermediate transformer which supplies buildings used for domestic purposes such as shopping malls, cinemas, hospitals...
- Second environment: Industrial installations. Second Environment includes all plants other than those directly connected to the public low-voltage network which supplies buildings used for domestic purposes, e.g. factories and those other premises supplied by their own dedicated transformer.

Environment definition

The two environments are divided in four categories C1 to C4 that are summarized in the following table.

	FIRST ENVIRONMENT		SECOND ENVIRONMENT	
	C1	C2	C3	C4
Restricted Installation ^[1]	NO	YES	YES	YES ^[2]

Notes:

[1] "Restricted Installation" means that the installation and commissioning must be carried out by specialist personnel.

[2] C4 Category applies only for complex systems or when ratings are equal or above to 1000 V or 400 A which are unable to comply with the limits of C3 Category. In these cases, C4 Category can be achieved by adjusting the equipment in situ and applying the EMC recommendations.

SD300 compliance

SD300 variable speed drives with Extended EMC have been designed for the industrial use (Second Environment). In the case of the Standard EMC equipment, an external filter must be installed to meet C3. The correct installation following the recommendations within this manual, permit to achieve compliance with C3 category defined in IEC/EN 61800-3.

Optionally, the SD300 drive with non-floating earth can be installed in residential areas (First Environment) by employing optional RFI filters that permit to achieve the C2 category.

The SD300 is not a retail unit. It is neither a plug in device nor a movable device and it is intended to be installed and commissioned by qualified personnel. However, C1 category will not be required.

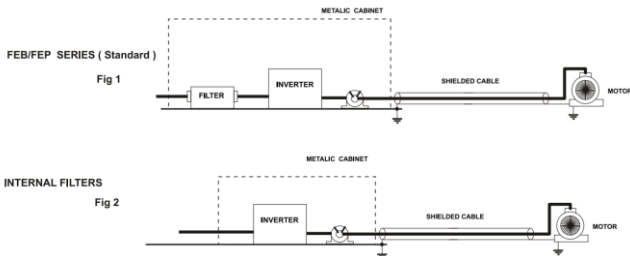
The SD300 with floating earth configuration can be installed in industrial (Second Environment) IT grids. Equipment with Extended EMC comply with C3 (Second Environment). In the case of the Standard EMC equipment, an external filter must be installed to meet C3.

EMC Recommendations

To conform the EMC directive, it is necessary that these instructions be followed as closely as possible. Follow the usual safety procedures when working with electrical equipment. All electrical connections to the filter, inverter and motor must be made by a qualified electrical technician.

1. Check the filter rating label to ensure that the current, voltage rating and part number are correct.
2. For best results, the filter should be fitted as closely as possible to the incoming mains supply of the wiring enclosure, usually directly after the enclosures circuit breaker or supply switch.
3. The back panel of the wiring cabinet of board should be prepared for the mounting dimensions of the filter. Be sure to remove any paint etc from the mounting holes and face area of the panel to ensure the best possible earthing of the filter.
4. Mount the filter securely.
5. Connect the mains supply to the filter terminals marked LINE, connect any earth cables to the earth stud provided. Connect the filter terminals marked LOAD to the mains input of the inverter using short lengths of appropriate gauge cable.
6. Connect the motor and fit the ferrite core (output chokes) as close to the inverter as possible. Armoured or screened cable should be used with the 3 phase conductors only threaded twice through the center of the ferrite core. The earth conductor should be securely earthed at both drive and motor ends. The screen should be connected to the enclosure body via and earthed cable gland.
7. Connect any control cables as instructed in "Wiring Recommendations" section, inside "CONTROL CONNECTION" section.

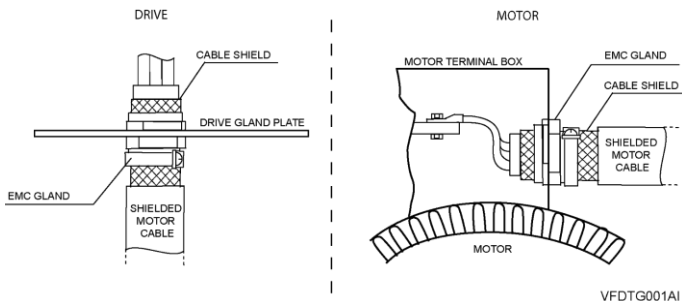
It is important that all lead lengths are kept as short as possible and that incoming mains and outgoing motor cables are kept well separated.



Connection

It is recommended the use of braided shielded motor cables to achieve compliance with C3 category. Wiring and Installation recommendations are included in previous sections: “Power Connection and Wiring”, “Ground Connection” and “EMC Installation Requirements”.

In shielded cables it is recommended to connect the shield by making 360° contact in both the drive cabinet and the motor terminal box. As an example, EMC cable glands can be installed as shown in the next figure.



Correct output motor cables shield bonding

It is recommended to use shielded cable for control signals and to follow recommendations included in Wiring Recommendations section.



CAUTION

Select communication and control system according to the drive EMC environment. Otherwise, systems could suffer from interferences due to a low EMS level.

Protections

Safety Stop Function

Safe Torque Off (STO) allows the drive output to be disabled so that the drive cannot provide power or generate torque in the motor.

The Safe Torque Off function meets EN ISO 13849-1 PLd and EN 61508 SIL2 (EN60204-1, stop category 0). This feature is standard and enables compliance with current safety standards. See “STO” point, inside “CONTROL CONNECTION” section for further information.

Ground Fault Protection

The drive is equipped with an internal software, the ground fault protective function protects the drive against input and output unbalanced currents. For further information, see the Programming and Software Manual.

This function is not intended to work as a safety or fire protection, so an external protection must be provided to ensure that a substantial ground fault current is promptly interrupted. The SD300 drives are compatible to operate with Type B RCDs, if it is required. The EMC filters and long motor cables increase the ground leakage currents, so the threshold response of the protection should be adjusted to suit the surrounding plant conditions. For additional information, contact with Power Electronics.

Short Circuit

The following table shows the voltage and current ratings for fuses and circuit breakers.

Model		AC Input Fuse		AC Reactor		DC Reactor	
		Current [A]	Voltage [V]	Inductance [mH]	Current [A]	Inductance [mH]	Current [A]
230V 1-phase	0.4 kW	10	600	1.2	10	4	8.67
	0.75 kW			0.88	14	3	13.05
	1.5 kW	20		0.56	20	1.3	18.45
	2.2 kW			1.2	10	4	8.67
0.4 kW	10	0.88		14	3	13.05	
0.75 kW		0.56		20	1.33	18.45	
1.5 kW	15	0.39		30		26.35	
2.2 kW	20						
3.7 kW	32	0.3		34	1.6	32	
4 kW	50	0.22		45	1.25	43	
5.5 kW	50	0.16		64	0.95	61	
7.5 kW	63						
230V 3-phase	11 kW	80		0.13	79	0.7	75
	15 kW	100					
	0.4 kW	10		4.81	4.8	16	4.27
	0.75 kW			3.23	7.5	12	6.41
400V 3-phase	1.5 kW	15		2.34	10	8	8.9
	2.2 kW			1.22	15	5.4	13.2
	3.7 kW	20		1.12	19	3.2	17
	4 kW			0.78	27	2.5	25
	5.5 kW	32		0.59	35	1.9	32
	7.5 kW			0.46	44	1.4	41
	11 kW	50		0.4	52	1	49
	15 kW			0.3	68	0.7	64
	18.5 kW	70					
	22 kW	100					

Motor Thermal Protection

The drive includes a motor thermal protection that, based on the motor performance parameters, mathematically calculates the thermal reservoir of the motor. When this reservoir is reduced below the limits, the drive automatically stops the motor. The thermal sensitivity is configured in the programming parameters. For further information consult Software and programming manual.

Others

The drive can implement additional motor and drive protections such as power-loss ride through, automatic fly restart, high and low input and output voltage, pump overload and underload... For further information, consult Software and Programming manual.

Dynamic Braking Resistors



CAUTION

Do not touch the braking resistor during the drive operation. It could be very hot (over 150°C).

A dynamic brake controls the regenerated energy. The dynamic brake activates an IGBT to discharge the DC bus over external resistors when the DC voltage overpasses a pre-set value.

SD300 drives include a built-in dynamic brake as standard. The user only has to connect a resistor between terminals P2 and B of the power board (see "Power Terminals" section).

Reference	Input voltage (V)	Drive capacity (kW)	100% Braking		150% Braking	
			Ω	W*	Ω	W*
SD300312, SD300312F, SD300322, SD300326	230	0.4	400	50	300	100
SD300612, SD300612F, SD300622, SD300526		0.75	200	100	150	150
SD300912, SD300912F, SD300922, SD300826		1.5	100	200	60	300

Reference	Input voltage (V)	Drive capacity (kW)	100% Braking		150% Braking	
			Ω	W*	Ω	W*
SD301212, SD301212F, SD301222, SD301126		2.2	60	300	50	400
SD301822, SD301726		4	40	500	33	600
SD303022, SD302426		5.5	30	700	20	800
SD304022, SD303226		7.5	20	1000	15	1200
SD305622, SD304626		11	15	1400	10	2400
SD306922, SD306026		15	11	2000	8	2400
SD300242, SD300242F, SD300146, SD300146F	400	0.4	1800	50	1200	100
SD300342, SD300342F, SD300246, SD300246F		0.75	900	100	600	150
SD300542, SD300542F, SD300446, SD300446F		1.5	450	200	300	300
SD300742, SD300742F, SD300646, SD300646F		2.2	300	300	200	400
SD301042, SD301042F, SD300946, SD300946F		4	200	500	130	600
SD301642F, SD301246, SD301246F		5.5	120	700	85	1000
SD302342F, SD301646, SD301646F		7.5	90	1000	60	1200
SD303042F, SD302446, SD302446F		11	60	1400	40	2000
SD303842F, SD303046, SD303046F		15	45	2000	30	2400
SD304442F, SD303946, SD303946F		18.5	35	2400	20	3600
SD305842F, SD304546, SD304546F		22	30	2800	10	3600

Notes:

- The values of the braking resistors that appear in the table are the minimum recommended values. For a customized calculation, and adjusted to your application, please contact Power Electronics.
- The braking resistor should be non-inductive.
- To connect the sensor to the drive, it is recommended to use shielded cable.
- The maximum cable length between the drive and the external braking resistor is 20m. For other configurations, contact with Power Electronics

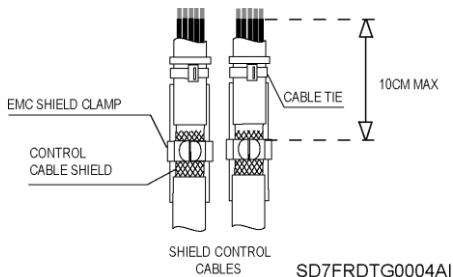
CONTROL CONNECTION

8

Wiring Recommendations

Before planning the installation, follow these recommendations. The parallel cable routing should be minimized and the distance between the control wiring and the power wiring should be maximized. It is recommended to route control cables with different voltages in separate cable racks, trays or ducts.

It is recommended to use shielded twisted cable for all the data, signal or control cables that exit the variable speed drive, with the shield correctly bonded to ground. To ensure an effective shield bonding, it is recommended to include in the SD300 front metal panel of the control board, EMC shield clamps that ensure a 360° effective shield bonding.



Shield bonding

Digital signal cables must be grounded at both ends of the cable (when there is no potential difference between equipment). It is recommended to use independent shielded cables for digital and analogue signals. When using multiple analogue signals do not use common return for them. If a low-interference is experienced (hum loops) using analogue signals disconnect the shield grounding from one of the ends. Please refer to section "Recommended Cable Section" for wire specifications and recommended tightening.

Although the control board is insulated galvanically, for safety reasons it is recommended not to modify the wiring while the equipment is connected to the input power supply.

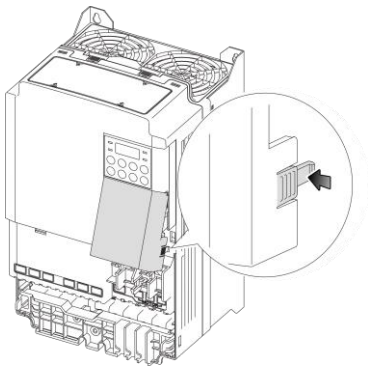


WARNING

Changes of control wiring or bridges should be performed after disconnecting the input power and checking, with a multimeter, that the DC Link voltage is discharged (below 30VDC). Otherwise, you may get an electric shock

Control Cables Access

The control cables must be connected to the control terminals located below the seven-segment display. Remove the terminals cover pushing on the right-side clip as follows:



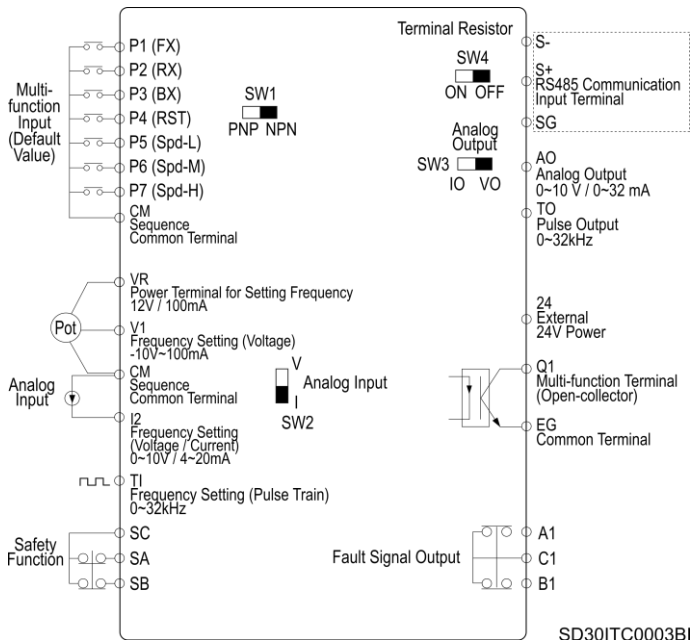
SD30ITM0019A 3

Terminals cover removal

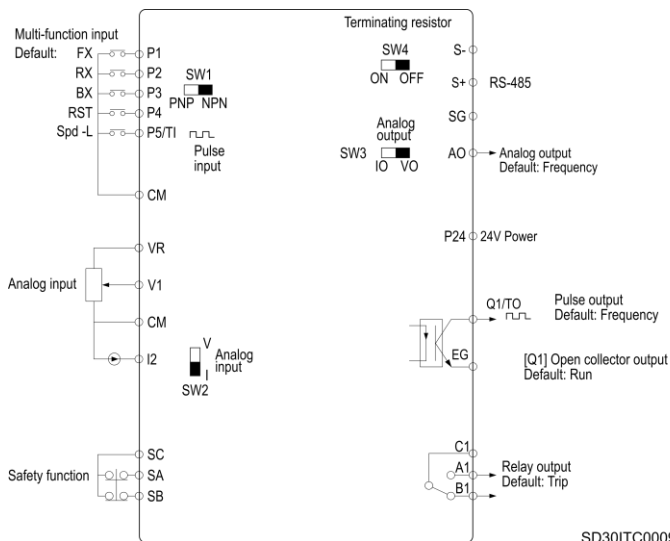
Control Board Terminals Description

The control board of the drive integrates some switches and connection terminals. These connection terminals vary depending on the equipment's degree of protection.

The following figures show the control board terminals schema:



IP20 drives standard control terminals connection



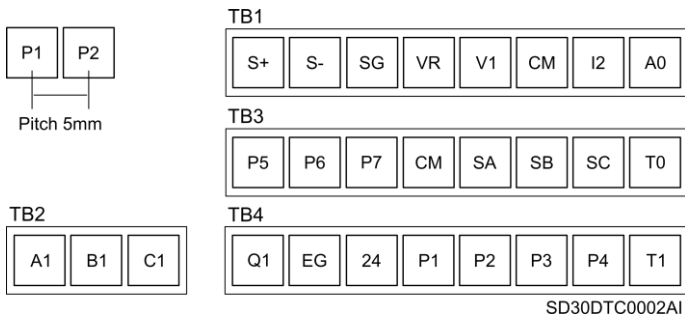
IP66 drives standard control terminals connection

Digital inputs can be configured individually or collectively. Analogue inputs can be configured as comparators. For further information, please refer to the Software and Programming Manual.

Note:

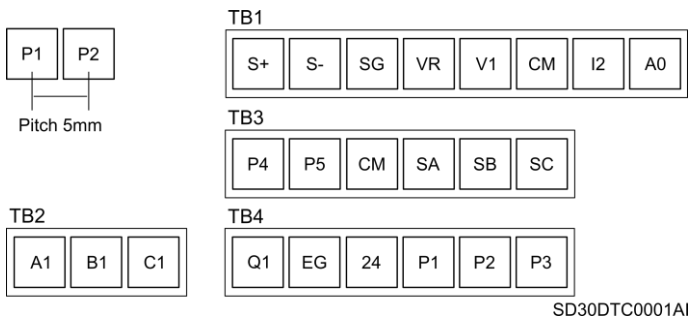
The frontal cover of the control terminals can be removed to facilitate ease of connection.

The following figure shows the control terminals for IP20 drives:



Standard control terminals for IP20

The following figure shows the control terminals for IP66 drives:



Standard control terminals for IP66 drives.

The following table contains the control terminals description:

SIGNAL	PIN	DESCRIPTION
DIGITAL INPUTS	P1	Configurable multi- function Input. Default value: FX.
	P2	Configurable multi- function Input. Default value: RX.
	P3	Configurable multi- function Input. Default value: BX.
	P4	Configurable multi- function Input. Default value: RST.
	P5	Configurable multi- function Input. Default value: Spd-L.
	P6 ^[1]	Configurable multi- function Input. Default value: Spd-M.
	P7 ^[1]	Configurable multi- function Input. Default value: Spd-H.
	CM	Common terminal for analog and digital terminal inputs and outputs.
DIGITAL OUTPUTS	Q1	Multi-function Terminal (Open-collector). 26VDC, ≤100mA. Default value: Run.
	EG	Common ground contact for an open collector (with external power source).
	24	External 24V power source. 150mA maximum output current.
	A1	Fault signal output. Sends out alarm signals when the inverter safety features are activated (AC 250V <1A, DC 30V < 1A).
	C1	- Fault condition: A1 and C1 contacts are connected (B1 and C1 open connection).
	B1	- Normal operation: B1 and C1 contacts are connected (A1 and C1 open connection).
ANALOGUE INPUTS	VR	Power terminal used to setup or modify a frequency reference via analog voltage or current input. Max output V/I: 12V / 100mA, Potentiometer 1~5kΩ.
	V1	Setup or modify a frequency reference via analog voltage input terminal. <ul style="list-style-type: none"> - Unipolar: 0 ~ 10V (max12V) - Bipolar: -10 ~ 10V (max ±12V)

[1]Only available in IP20 drives.

SIGNAL	PIN	DESCRIPTION
	I2	Configurable voltage/current input using the SW2 switch. Voltage / Current Analog Input (0~10V (max 12V) / 4~20mA (max 24mA, input resistance: 249Ω)).
	TI ^[1]	Frequency Setting (Pulse Train) 0~32kHz. - Low level: 0-0.8V - High Level: 3.5-12V In IP66 drives, this input is shared with the P5 terminal. This terminal must be set as TI in the parameter G5.69 to use it as a train pulse input. For more information consult the Programming and Software Manual.
ANALOGUE OUTPUTS	AO	Configurable analogue output V/I (0~10V (max 12V/10mA) / 0~20 mA (max 24mA)).
	TO ^[1]	Pulse Output signals 0~32kHz and 0-12V. Use only a wire to connect this signal to the input of another SD300 drive. Do not install any resistor. In IP66 drives, this output is shared with the Q1 terminal.
RS485 COMMUNICATION	S-	Communication port RS485 with Modbus protocol up to 115200 Kbit/s.
	SG	
	S+	
STO	SC	Safe Torque Off (STO) input available by default. Used to block the drive's output in an emergency. Built-in two NC relays SA and SB. (24VDC, <25mA.) Conditions: - Normal Operation: Both the SA and SB terminals are connected to the SC terminal. - Output Block: One or both of the SA and SB terminals lose connection with the SC terminal.
	SA	
	SB	

[1] Only available in IP20 drives.

Pulse Output Signals Connection in IP66 Drives

In IP66 drives, the pulse output signal is shared with the Q1 terminal. This terminal must be set as TO in the parameter G6.33 and the next connections must be performed to use it as a train pulse output:

- Connect a 1/4W, 560Ω resistor between VR and Q1 terminals.
- Connect EG and CM terminals.

Recommended Cable Section

The recommended wire characteristics are summarized in the table below.
The wire length of the safety input should not exceed 30m.

Terminal Type	Recommended wire size [mm ²] (AWG)		Screw	Torque [N.m]
	No crimp-style terminal	Crimp-style terminal		
P1 – P7, CM	0.75 (18)	0.5 (20)	M2 (1/32")	0.22 ~ 0.25
VR				
V1				
I2				
AO				
Q1				
EG				
24				
TI				
TO				
SA, SB, SC				
S+, S-, SG				
A1, B1, C1	1.0 (17)	1.5 (15)	M2.6 (3/32")	0.4
A2, C2				

Control Switches

There are four control switches, one for the PNP/NPN mode, one for the terminal resistor and two for analog signals. They are described in the table below:

SWITCH		OPTIONS	DESCRIPTION
SW1	PNP / NPN	PNP / NPN	NPN/PNP mode selection switch.
SW2	ANALOG INPUT	V / I	Analog voltage/current input terminal selection switch.
SW3	ANALOG OUTPUT	IO / VO	Analog voltage/current output terminal selection switch.
SW4	TERMINAL RESISTOR	ON / OFF	Terminating Resistor selection switch.

STO - Safe Torque Off

The STO function is defined as follows:

Power, that can cause rotation, is not applied to the motor. The frequency converter will not provide energy to the motor, which can generate torque.

For three-phase asynchronous motor, that means to stop supplying alternating three-phase power to the stator.

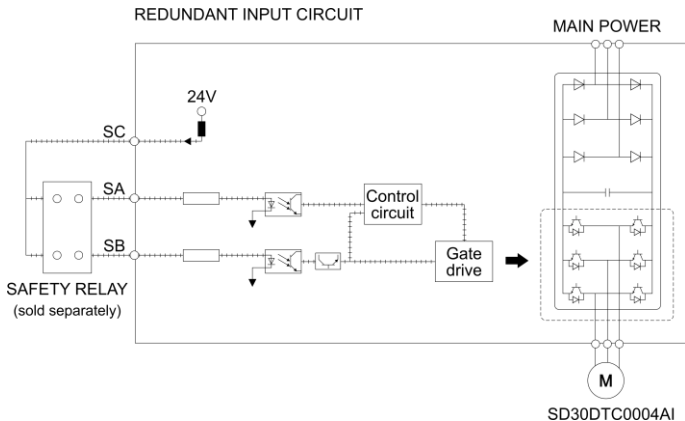
This function is included as standard in SD300 drives and corresponds with an Emergency Stop Category 0 according to IEC 60204-1. When the drive is running and the STO function is applied, the motor will freely stop by its own inertia.

The SD300's STO function permits to achieve two Safety Levels for the STO function. The safety integrity level SIL2 (PL_e) requires the use of an external SELV/PELV 24VDC source, emergency push button, and a safety relay SIL2 certified with feedback. For safety integrity, level SIL1 (PL_c) it is only required an external push button.

By using this function, cleaning, emergencies or maintenance work on non-electrical parts of the machinery can be performed without switching off the input power supply to the drive.

Based on the study of each application and a risk assessment, the designer should define the safety function required and each safety level.

The safety input function meets EN ISO 13849-1 PLd and EN 61508 SIL2 (EN60204-1, stop category 0)



Safe input function circuit



CAUTION

The STO safety function does not disconnect the main input power and auxiliary power supply. The drive disconnects the output motor power supply. Therefore, active conductors may be present inside so do not carry out electrical maintenance tasks without isolating the drive. Otherwise, it could cause damage to the equipment and lead to injury and even death.

Do not use the STO function as a normal drive stop.

According to EN 60204-1 automatic restart is not allowed after an emergency stop. For this reason, the machine control must prevent an automatic start after emergency stop.

COMMISSIONING

9



CAUTION

Only qualified personnel are allowed to commission the drive. Read and follow the safety instructions on the first pages of this manual. Neglecting the safety instructions can cause injuries or even death.

Ensure that there is no voltage present in the input power terminals and no voltage can be connected to the drive inadvertently.

This chapter does not include all the tasks to be performed during commissioning, follow local and national regulations.

In order to carry out a commissioning correctly, we recommend checking the following steps:

Check the compatibility of the upstream protections (circuit breaker, fuses, etc...) that could cause an unexpected stop during the soft charge.

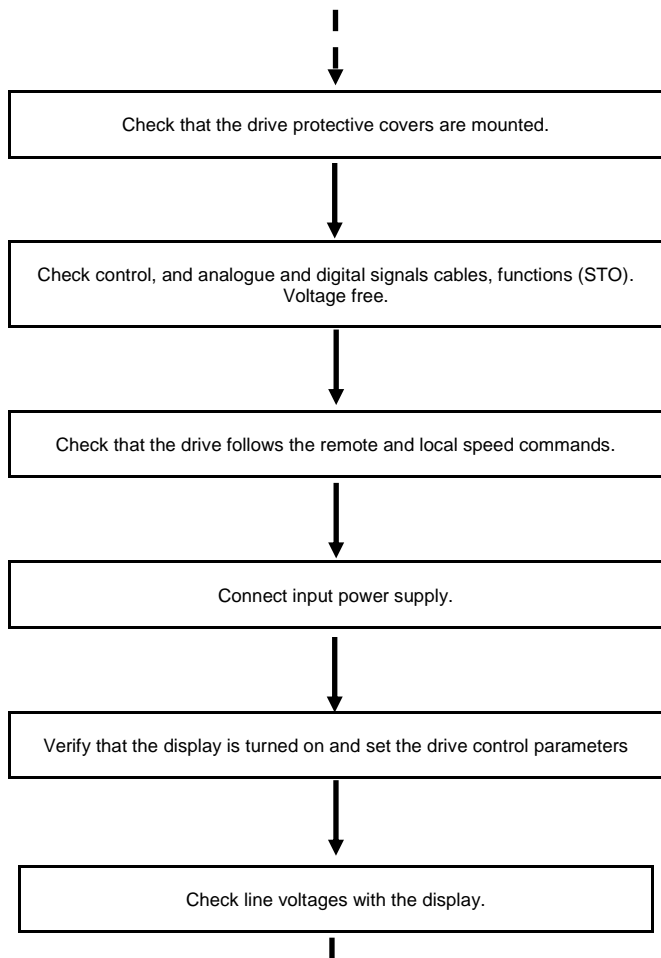


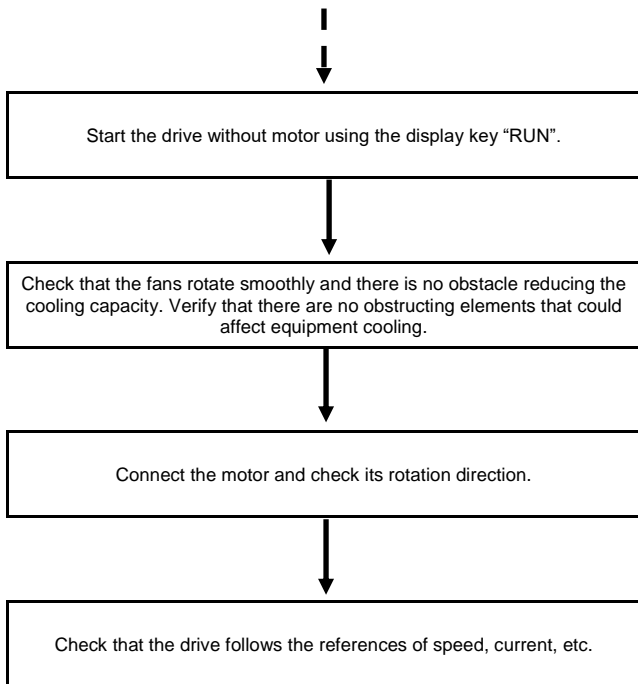
Verify that the line voltage is compatible with drive voltage range. If not, the drive could get damaged.



Connect input, PE and output power wiring, and verify that they are correctly installed and fastened.







MAINTENANCE

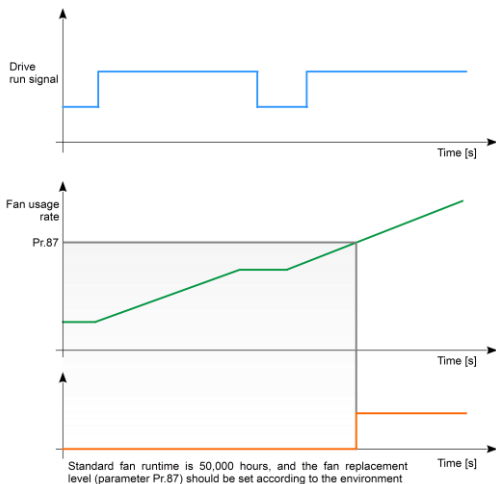
10

SD300 drives consist of advanced semiconductor devices. Temperature, humidity, vibration and deteriorated components can reduce their efficiency. To avoid any possible irregularities, we recommend making periodic inspections.

Cooling

It is possible to replace the cooling fan without dismounting the whole equipment. To do this, unscrew the screws and disconnect the connector.

The following image shows the standard fan usage rate. Replacement level can be set in parameter Pr.87.



SD301TCC0001BI

Fan usage rate

Warnings

- Make sure to disconnect the input power while performing maintenance.
- Make sure to perform maintenance after checking the DC Link capacitor has discharged. Check that the voltage between DC terminals +, - is below DC 30V. The bus capacitors in the drive main circuit can still be charged even after the power is turned off.
- The correct output voltage of the drive can only be measured by using an RMS voltage meter. Other voltage meters, including digital voltage meters, are likely to display incorrect values caused by the high frequency PWM output voltage of the drive.

Routine Inspection

Make sure to check the following points before handling the drive:

- Installation site conditions.
- Drive cooling system conditions.
- Excessive vibrations or noise in the motor.
- Excessive overheating.
- Normal output current value on the monitor.

The following table summarizes the maintenance tasks that should be carried out monthly, annually and every two years:

Inspection site	Inspection	Period			Inspection method	Criterion	Measurement instrument
		Monthly	1 year	2 years			
All	AMBIENT CONDITIONS						
	Are the ambient temperature and humidity within specification?	o			Visual check	Temperature: HD IP20: -10~50°C (14~122°F) / HD IP66: -10~40°C (14~104°F) / ND: -10~40°C (14~104°F). Humidity: below 95% non-condensing.	Thermometer, Hygrometer, Recorder.
	MODULE						
	Are there any abnormal noises or oscillations?	o			Visual and audible.	There are no anomalies.	
	POWER VOLTAGE						
	Are the input and output voltages normal?	o			Measure voltage between R/S/T phases in. the terminal block.	Values are within Standard Ratings (see section 2).	Digital multimeter tester
Main circuit	ALL						
	Megger test (between input / output terminals and ground terminal)		o	o	Disconnect drive and short R/S/T/ U/V/W terminals, and then measure from each terminal to the ground terminal using a Megger.	Above 5MΩ	Megger type 500V
	Is there anything loose in the device?		o	o	Tighten up all screws.	No anomaly.	
	Is there any evidence of parts overheating?		o	o	Visual inspection	No anomaly.	

Inspection site	Inspection	Period			Inspection method	Criterion	Measurement instrument
		Monthly	1 year	2 years			
Main circuit	CONDUCTOR / CABLE						
	Is the conductor corroded?		o		Visual check.	No anomaly.	
	Is the cable shield damaged?		o				
	TERMINAL						
	Is there any visible damage?		o		Visual check.	No anomaly.	
	CORRECT CAPACITOR						
	Have fluid leakages been observed?	o			Visual check. Measure the capacitance with a proper instrument.	No anomalies. Capacitance higher than 85% of rated capacitance.	Instrument for measuring capacity.
	Is the capacitor well fastened?		o				
	Are there any signs of dilation or retraction?	o					
	CONTACTOR						
	Is there any contactor chatter?		o		Audible check.	No anomaly.	
	Is the contact damaged?		o		Visual check.		
OPTIONAL BRAKING RESISTOR							
Is there any damage from resistance?		o		Visual inspection.	No anomaly.	Digital multimeter / analog tester	
Check for disconnection		o		Disconnect one side and measure with a tester.	Must be within +/- 10% of the rated value of the resistor.		
Control circuit and Protections	OPERATING CHECK						
	Is there any imbalance between output voltage phases?		o		Measure voltage between output terminals U, V and W.	Balanced voltage between phases.	Digital multimeter / RMS voltage meter.
	Are there any errors in the display circuit after the sequence protection test?		o		Test the drive output protection in short and open circuit conditions.	The circuit must work according to the sequence.	

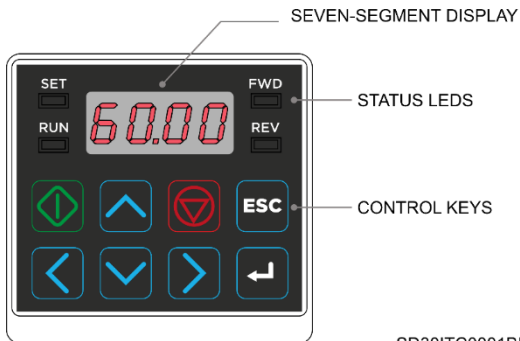
Inspection site	Inspection	Period			Inspection method	Criterion	Measurement instrument
		Monthly	1 year	2 years			
Cooling system	COOLING FANS						
	Are there any abnormal noises or oscillations? Is the cooling fan disconnected?	<div>o</div>	<div>o</div>		Disconnect the power supply (OFF) and rotate the fan manually. Check the connections.	Fan should rotate effortlessly. No anomaly.	
Display	MEASUREMENT						
	Is the displayed value correct?	<div>o</div>	<div>o</div>		Check the reading instrument with an external measurement.	Check the specified values and the control values.	Voltage meter / Current meter etc.
Motor	ALL						
	Is there any noise or abnormal vibrations? Has any unusual smell been reported?	<div>o</div> <div>o</div>			Audible, sensory and visual check. Check if damages have been produced by overheating.	No anomaly.	
	INSULATION RESISTANCE						
	Megger test (between the input, output and ground terminals)			<div>o</div>	Disconnect the cables for terminals U/V/W and test the wiring.	Above 5MΩ	Megger type 500V

Note: Long life of the main components above indicated are based on a continuous operation for the stipulated load. These conditions can change according to the environment conditions.

USE OF THE DISPLAY




11






SD300 variable drives have a built-in seven segment display which provides intuitive data presentation, an easy navigation through the control parameters and allows storing thousands of user-customized configurations.



SD30ITC0001BI

It has four indicator leds that supply information about the drive operational status, plus eight control keys. They are described in the table below:

KEY / LED	NAME	FUNCTION
	RUN key	Run command.
	STOP/RESET key	STOP: Stop command during operation. RESET: Reset command when a fault occurs.
	UP key	Used both to scroll up through the parameters of a group and to increase a parameter value.

KEY / LED	NAME	FUNCTION
	DOWN key	Used both to scroll down through the parameters of a group and to decrease a parameter value.
	Left key	Used to jump to other parameter groups or move the cursor to the left.
	Right key	Used to jump to other parameter groups or move the cursor to the right.
	Enter key	Used to set a parameter value or to save the changed parameter value.
	Escape key	Used to cancel the changes or to switch from Remote/Local if this option was previously configured.
FWD LED	Forward Run	Illuminated during forward run. LEDS flicker when a fault occurs.
REV LED	Reverse Run	Illuminated during reverse run.
RUN LED	Run	Illuminated during operation / Flickering during acceleration/deceleration.
SET LED	Setting	Illuminated during parameter setting / Flickering when the ESC key is operating as a multi-key.
Seven-segment display	Current value	Indicates operating conditions and parameter data.

The following table shows the different characters of the seven-segment display:

0	0	A	A	K	K	U	U
1	1	b	B	L	L	v	V
2	2	c	C	n	M	W	W
3	3	d	D	n	N	x	X
4	4	E	E	O	O	y	Y
5	5	F	F	P	P	z	Z
6	6	G	G	Q	Q	-	-
7	7	H	H	r	R	-	-
8	8	I	I	S	S	-	-
9	9	J	J	t	T	-	-

To learn how to switch between groups and parameters, follow the next examples:

Step	Instruction	Keypad display
1	Move to the desired group using the [◀] and [▶] keys.	
2	Move up and down through the parameters using the [▲] and [▼] keys.	
3	Press the [ENT] key to save the changes.	

Binary numbers are shown in the integrated display as segment lines. “1” is displayed in the top part of the display and “0” in the bottom part. For example, “010” is represented as:



STATUS MESSAGES

12

List of Status Messages

Screen	Name	Description
FLT	Fault trip	The drive is in fault state
DCB	DC Brake	The SD300 has injected DC current to stop the motor.
STP	Stopping	The drive is decreasing the output frequency due to a stop order.
DCL	Decelerating	The drive is decreasing the output frequency. The motor is decreasing its speed, it is decelerating.
ACL	Accelerating	The drive is increasing the output frequency. The motor is increasing its speed, it is accelerating.
RUN	Running	The drive is operating at reference speed. The motor will keep the introduced speed as setpoint. Operating in nominal rate.
RDY	Ready	The drive is ready for commissioning.

WARNING & FAULT MESSAGES

13

List of Warning Messages

The following table summarizes the possible warning messages that may be displayed and their description.

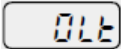

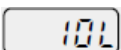
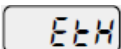
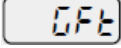
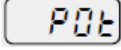
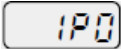
Screen	Name	Description
OLU	Over Load	Displayed when the motor is overloaded. Operates when Pr.17 is set to 1 'YES'. To operate, set the digital output terminal or relay OU.31or OU.33 to 5 'OVERLOAD' to receive overload warning output signals.
ULU	Under Load	Displayed when the motor is underloaded. Operates when Pr.25 is set to 1 'YES'. Set the digital output terminal or relay OU.31or OU.33 to 7 'UNDERLOAD' to receive underload warning output signals.
IOLU	INV Over Load	Displayed when the overload time equivalent to 60% of the drive overheat protection level is accumulated. Set the digital output terminal or relay OU.31or OU.33 to 6 'IOL' to receive drive overload warning output signals.
LCU	Lost Command	Lost command warning alarm occurs even with Pr.12 set to 0 'None'. The warning alarm occurs based on the condition set at Pr.13 to Pr.15. Set the digital output terminal or relay OU.31or OU.33 to 13 'LOSTCOMMAND' to receive lost command warning output signals. If the communication settings and status are not suitable for P2P, a Lost Command alarm occurs.
FANU	Fan Warning	Displayed when an error is detected from the cooling fan while Pr.79 is set to 1 'WARN'. Set the digital output terminal or relay OU.31or OU.33 to 8 'FAN WARNING' to receive fan warning output signals.

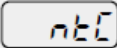
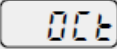
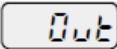
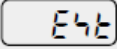
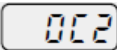
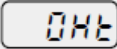
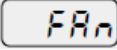
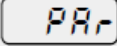
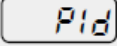
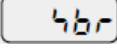
Screen	Name	Description
EFAN	Fan Exchange	An alarm occurs when the value set at Pr.86 is above the value set at Pr.87. To receive fan exchange output signals, set the digital output terminal or relay OU.31 or OU.33 to 38 'FAN EXCHANGE'.
ECAP	CAP Exchange	An alarm occurs when the value set at Pr.63 is less than the value set at Pr.62 (the value set at Pr.61 must be 2 'Pre Diag'). To receive CAP exchange signals, set the digital output terminal or relay OU.31 or OU.33 to 36 'CAP Exchange'.
DBU	DB Warn %ED	Displayed when the DB resistor usage rate exceeds the set value. Set the detection level at Pr.66
TRTR	Retry Tr Tune	Tr tune error warning alarm is activated when dr.9 is set to 4 'S-less1'. The warning alarm occurs when the motors rotor time constant (Tr) is either too low or too high.

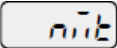
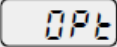
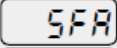
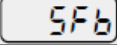
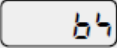
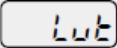
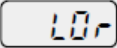
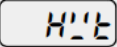
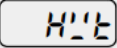
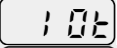
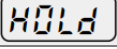
List of Fault Messages & Troubleshooting

Section List of fault messages shows a list of all possible faults. Probable causes and troubleshooting for each fault are listed in section Fault troubleshooting.

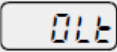
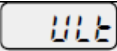
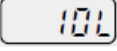
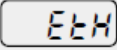
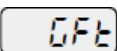
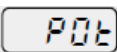
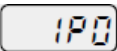
List of fault messages

SCREEN	DESCRIPTION
-	The equipment is operative. No fault is present.
	Overload. The drive trips when the output current reaches the value set in parameter Pr.21, exceeding the time limit set in parameter Pr.22. The protection is operative if the parameter Pr.20 has been set with a value different to 0 'NONE'.
	Underload. The motor is working with insufficient load. The drive trips when its current is within the values set in parameter Pr.29 and Pr.30 exceeding the time limit set in parameter Pr.28. The protection will be enabled if the parameter Pr.27 has been set with a value different to 0 'NONE'.
	Inverter Overload. The drive cuts the output supply when the output current exceeds the value set in the corresponding parameters (150% for 1 minute, 200% for 3 seconds of the drive rated current). Protection is based on drive rated capacity, and may vary depending on the device capacity.
	E-Thermal. The internal thermo-electronic protection determines the motor overheating. If the motor is overheated, the drive stops its output. The protection is enabled setting the parameter Pr.40 to a value different than 0 'NONE'.
	Ground Fault. The drive trips when an earth leakage and its current exceed the internal value configured in the drive. The overload protection function will protect the drive from any ground fault caused by a small leakage resistance.
	Output Ph Loss. One of the three output phases is open. The protection will be enabled if the parameter Pr.5 is set as 1 'OUTPUT' or 3 'ALL'.
	Input Ph Loss One of the three input phases is open. The protection will be enabled if the parameter Pr.5 is set as 2 'INPUT' or 3 'ALL'.

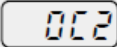
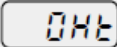
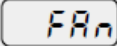


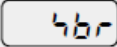
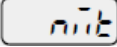
SCREEN	DESCRIPTION
	NTC. The drive uses a NTC thermal sensor to detect temperature increases within the supply system. When this message is displayed, the thermal sensor cable may have been cut. (The drive will continue running).
	Overcurrent. The drive trips when the output current exceeds the 200% of the rated current value.
	Overvoltage. The drive trips if the DC voltage within bus exceeds the value established. This value has been established in the internal configuration during the deceleration process or when the motor regenerative energy return to the drive is excessive for the capacitors which compose the DC bus. This fault can also be caused due to a transitory overvoltage within the supply system.
	External Trip. This function can be used whenever the user needs to cut the output by the use of an external trip signal. The open /closed contact use will depend on the configuration within the digital inputs (In.65-In.71) configured as 4 'EXTERNAL TRIP'. The drive cuts the motor output protecting it from the controlled situation within the terminal.
	Short ARM. The drive trips when a short-circuit occurs in the IGBT or in the output power.
	Overheat. The drive trips if overheated caused by a damaged cooling fan or by the presence of any strange substance within the cooling system.
	Fan trip. An anomaly detecting within the cooling fan. The protection will be enabled if parameter Pr.79 is set as 0 'TRIP'.
	Param_Wr_Err. A problem has been detected during the writing of a parameter by keypad.
	Pipe Fill Flt. An error has been detected which makes the PID feedback be always under the established value. Possible pipe breakdown.
	External Brake. Drive trips when the braking unit reaches a dangerous temperature.

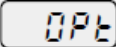

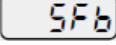
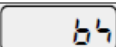
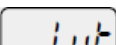
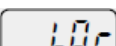


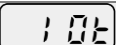
SCREEN	DESCRIPTION
	No Motor. The drive has not detected a connected motor at its output when the Start order has been given. The protection is enabled setting the parameter Pr.31 to a value different to 0 'NONE'.
	Slot 1 Fail. The optional board located in the slot1 has been extracted or there is no possible communication.
 	STO. Automatic internal protection of several of the IGBT semiconductors has acted or the safe stop contact of the drive (connected to an external circuit by the user) has been activated (for example, emergency stop).
	BX: One of the digital inputs (In.65-In.71) has been enabled configured as 1 'DIS START', forcing the drive to cut the output supply and making it stop due to inertia.
	LV. The drive trips when the voltage within the DC bus is under the detection level. Therefore, the torque generated can be insufficient or the motor can be overheated if the input voltage decreases.
	Lost command. The drive trips due to a loss of speed set point established by the use of the control or communication terminals.
	ADC Error. Analog Input error.
	Shown upon detection of an error in the EEPROM memory or the analogue input, or when a micro-controller internal fault is detected (Watchdog-1 Err, Watchdog-2 Err).
 	IO board fault. Displayed when the I/O board or external communication card is not connected to the drive or there is a bad connection.

Fault troubleshooting

Screen	Description or possible cause	Actions
	Elevated motor consumption caused by an excessive load.	Increase the motor and drive capacity.
	Load defined in parameter Pr.21 is too low	Increase the defined value in parameter Pr.21.
	A connection problem between the motor and the load is present.	Check the connection between motor and load is correctly set.
	The load defined in parameters Pr.29 and Pr.30 is too low.	Increase the value defined in parameters Pr.29 and Pr.30.
	The load within the drive is greater than the rated value of the drive.	Increase the motor and drive capacity.
	The start torque setting is too high.	Reduce the start torque value.
	Motor overheated.	Reduce load and / or operating cycle
	Load exceeds the drive capacity.	Use a more powerful drive.
	Electro-thermal protection level (ETH) too low.	Set the ETH level properly.
	Invalid selection of the drive rated power.	Select a correct drive power.
	Invalid V/f pattern setting.	Select a correct V/f pattern.
	Ground leakage produced in the drive output.	Check the drive output wiring.
	The motor insulation is damaged due to heat.	Change the motor.
	Problem present in the drive output electric connection.	Check the output electric connections.
	Poor output electric distribution.	Check that the output electric distribution is correct.
	Problem present in the drive input electric connection.	Check the input electric connections.
	Bad input electric distribution.	Check that the input electric distribution is correct.
	The drive DC capacitor must be replaced.	Replace the drive DC capacitor. Contact the Technical Service.

Screen	Description or possible cause	Actions
	The room temperature is over the allowed range.	Keep the installation location at room temperature within the specified limits.
	Problem present in the drive internal temperature sensor.	Contact the Technical Service.
	Acceleration / deceleration time too short compared to the load inertia.	Increase the acceleration / deceleration time.
	The load exceeds the drive rated power.	Increase the drive rated power.
	The drive attempts to start the motor while spinning.	Ensure the correct programming spin start conditions. Set the load inertia and the parameters which enable the speed search properly. Note: Adequate spin start conditions fulfilment depends on each installation.
	Ground fault or short circuit produced.	Check the output wiring.
	The mechanic brake enters too quickly.	Check the mechanic brake.
	The power circuit components overheated due to a cooling fan malfunction.	Check the cooling fan. Verify it is correctly powered and not blocked by dirt.
	Caution: Starting the drive without correcting anomalies may damage the IGBTs.	
	The deceleration time is too short compared to the load inertia.	Increase the deceleration time.
	Excessive energy regeneration in the drive.	Use an optional brake resistor (dynamic brake units).
	Line with High Voltage.	Check the supply line voltage.
	External fault produced.	Delete the circuit fault connected by the input fault terminal configured.





Screen	Description or possible cause	Actions
	Short circuit upper and lower IGBT.	Check IGBT.
	Short circuit at the drive output.	Check the wiring of the drive output circuit.
	Acceleration / deceleration time is too short compared with the inertia of the load (GD^2)	Increase acceleration / deceleration time.
	Cooling fan damaged or foreign matter present.	Replace the cooling fans and / or remove the foreign matter.
	Fault within the cooling system.	Check the foreign matter presence.
	Excessive room temperature.	Keep the room temperature under 50°C or verify the drive capacity according to temperature.
	Motor overheat produced (PTC / NTC external signal) produced.	Check the motor cooling. Reduce the load and / or operating cycle.
	Cooling fan damaged or foreign matter present.	Replace the cooling fans and or remove the foreign matter.
	A problem occurred while editing a parameter with the numeric keyboard.	Check if the keyboard is properly inserted.
	Possible pipe breakdown inhibits pressure to reach the minimum level.	Check installation pipe status.
	PID feedback sensor is not showing the correct values.	Check the PID feedback pressure sensor is measuring properly. In case it is damaged, replace it.
	The braking unit has reached a dangerous temperature.	Check the braking unit.
	No motor connected to the drive output or defective wiring.	Check the motor is correctly connected to the drive output.
	The value set in parameter Pr.31 is too high.	Reduce the value of parameter Pr.31.

Screen	Description or possible cause	Actions
	The port 1 optional board is not connected properly.	Check the board is inserted in the expansion board slot.
	Defective optional board.	Replace the optional board for a new one.
	Defective optional board.	Replace the optional board.
 	The internal automatic protection of several IGBTs or the drive safe stop contact have been activated (connected by the user to an external circuit). E.g.: Emergency stop.	Check if the circuit is properly wired. Check wiring and ensure that neither of both circuits is open.
	One of the digital inputs configured as 1 'DIS START' has been enabled.	Disable the digital input configured as 1 'DIS START'.
	Low voltage in the line	Check the line voltage.
	Load exceeds the line rated power (welding machine, motor with high start current connected to the commercial line)	Increase the line rated power.
	Defective magneto thermic switch in the drive supply circuit.	Change the magneto thermic switch.
	Speed reference lost introduced through the communications or keypad inputs.	Check the drive communications or the inputs are within the defined ranges to provide the speed references.
-	Connection of the seven-segment display is not correct.	Check the connection.
	Analog input error produced.	Contact the Technical Service.
	EEP Error (memory fault).	Disconnect and reconnect the power supply. If it fails, contact Power Electronics' Technical Service.
	Watchdog Error (CPU fault).	Disconnect and reconnect the power supply. If it fails, contact Power Electronics' Technical Service.
	I/O board or external communication board fault.	Check the board is properly connected and it is not damaged.

DESCRIPTION OF PROGRAMMING PARAMETERS

14

The different parameters of the SD300 are organized in groups and are described within this section.

Use the left  and right  arrow keys to jump from a parameter group to another. Use the up  and down  keys to navigate between the parameters of the selected group.

Please refer to section “USE OF THE DISPLAY”, for instructions on how to modify parameter values.

Group 0: Operation

This group is only available in the integrated display. It allows performing a basic set up of the drive with its main parameters.

Screen	Description	Default value	Modbus Address		Function
			DEC	HEX	
0.00 ^[1]	Target frequency	0.00Hz	47936	0h1F00	Set the motor speed. See group Drive(dr), parameter 0.00.
ACC ^[1]	Acceleration time	20.0s	47937	0h1F01	See group Drive (dr), parameter ACC.
dEC ^[1]	Deceleration time	30.0s	47938	0h1F02	See group Drive (dr), parameter dEC.
drv ^[1]	Command source	1 = Remote	47939	0h1F03	See group Drive (dr), parameter drv.
Frq ^[1]	Frequency reference source	0 = Local	47940	0h1F04	See group Drive (dr), parameter Frq.
St1 ^[1]	Multi-step speed frequency 1	10.00Hz	47941	0h1F05	See group Basic Functions (bA), parameter St1.
St2 ^[1]	Multi-step speed frequency 2	20.00Hz	47942	0h1F06	See group Basic Functions (bA), parameter St2.

[1] Displayed when an LCD keypad is in use.

Screen	Description	Default value	Modbus Address		Function
			DEC	HEX	
St3 ^[1]	Multi-step speed frequency 3	30.00Hz	47943	0h1F07	See group Basic Functions (bA), parameter St3. These values depend on drive characteristics.
CUr	Output current	-	47944	0h1F08	
rPM	Motor revolutions per minute	-	47945	0h1F09	
dCL	Inverter direct current voltage	-	47946	0h1F0A	
vOL	Inverter output voltage	-	47947	0h1F0B	
LuT	Out of order signal	-	47948	0h1F0C	
drC	Select rotation direction	-	47949	0h1F0D	

Group 1: Drive → dr

Screen	Description	Default value	Range	Function	Set on RUN
0.00 ^[1]	Local speed	0.00Hz	dr.19 to dr.20	Set the motor speed value. Minimum value is set in dr.19 and the maximum value in dr.20.	YES
dr.2	Local torque	0.0%	-180.0 to 180.0%	Set the torque value of the motor.	YES
ACC ^[1]	Acceleration ramp	20.0s	0.0 to 600.0s	Set the acceleration ramp 1, in seconds. This ramp will be set according to the requirements of each process.	YES
dEC ^[1]	Deceleration ramp	30.0s	0.0 to 600.0s	Set the deceleration ramp 1, in seconds. This ramp will be set according to the requirements of each process.	YES

[1] Displayed when an LCD keypad is in use.

Screen	Description	Default value	Range	Function	Set on RUN																					
drv ^[1]	Control mode 1	1 = Remote	0 to 5	Set the control mode to command the drive (Start/Stop, Reset...).	NO																					
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>LOCAL</td><td>Drive is controlled from the keypad.</td></tr><tr><td>1</td><td>REMOTE</td><td>Commands are sent from the control terminals.</td></tr><tr><td>2</td><td>REMOTE 2</td><td>Commands are sent from the control 2 terminals.</td></tr><tr><td>3</td><td>MODBUS</td><td>The drive is controlled through the communications bus, integrated in the equipment.</td></tr><tr><td>4</td><td>COMMS</td><td>The drive control is carried out by the use of any of the optional communication boards.</td></tr><tr><td>5</td><td>PLC</td><td>The common area can be linked with the user sequence output and can be used as command.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	LOCAL	Drive is controlled from the keypad.	1	REMOTE	Commands are sent from the control terminals.	2	REMOTE 2	Commands are sent from the control 2 terminals.	3	MODBUS	The drive is controlled through the communications bus, integrated in the equipment.	4	COMMS	The drive control is carried out by the use of any of the optional communication boards.	5	PLC	The common area can be linked with the user sequence output and can be used as command.
				OPT.		DESCR.	FUNCTION																			
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5	PLC	The common area can be linked with the user sequence output and can be used as command.																								

[1] Displayed when an LCD keypad is in use.

Screen	Description	Default value	Range	Function	Set on RUN		
Frq ^[1]	Speed reference 1	0 = Local	0 to 12	Select the source for the speed reference.		NO	
				OPT.	DESCR.		FUNCTION
				0	LOCAL		Reference will be given by keypad and will be set in dr.1.
				2	V1		Reference will be introduced through the voltage analog input 1.
				4	V2		Reference will be introduced through the voltage analog input 2.
				5	I2		Reference will be introduced through the current analog input 2.
				6	MODBUS		The reference will be introduced through Modbus.
				8	COMMS		The reference will be introduced through the communications.
				9	PLC		The common area can be linked with user sequence output and can be used as command.
				12	PULSE		Reference will be introduced through the Pulse input.

[1] Displayed when an LCD keypad is in use.

Screen	Description	Default value	Range	Function	Set on RUN
dr.8	Torque reference1	0 = LOCAL	0 to 12	Select the source for torque reference.	NO
				OPT. DESCR. FUNCTION	
				0 LOCAL Reference will be given by keypad and will be set in dr.1.	
				2 V1 Reference will be introduced through the voltage analog input 1.	
				4 V2 Reference will be introduced through the voltage analog input 2.	
				5 I2 Reference will be introduced through the current analog input 2.	
				6 MODBUS The reference will be introduced through Modbus.	
				8 COMMS The reference will be introduced through communications.	
				9 PLC The common area can be linked with user sequence output and can be used as command.	
				12 PULSE Reference will be introduced through the Pulse input.	

Screen	Description	Default value	Range	Function			Set on RUN
dr.9	Control type	V/Hz	0 to 6	Define the drive control type.			NO
				OPT.	DESCR.	FUNCTION	
				0	V/Hz	A linear V/Hz pattern configures the drive to increase or decrease the output voltage at a fixed rate for different operation frequencies. This is particularly useful when a constant torque load is applied.	
				2	SlipCom	Slip refers to the variation between frequency (synchronous speed) and motor rotation speed. As the load increases, there can be variations between the set frequency and motor rotation speed. Slip compensation is used for loads that require compensation of these speed variations.	
NOTE: Continues on the next page.							

Screen	Description	Default value	Range	Function			Set on RUN
dr.9	Control type	V/Hz	0 to 6	NOTE: Comes from the previous page.			
				OPT.	DESCR.	FUNCTION	
				4	S-less1	Sensorless vector control is an operation to carry out vector control without the rotation speed feedback from the motor but with an estimation of the motor rotation speed calculated by the drive. Sensorless vector control can generate greater torque at a lower current level than V/Hz control.	
				6	PM Sensor-less	It allows selecting the control for permanent magnet synchronous motors.	

Screen	Description	Default value	Range	Function	Set on RUN											
dr.10	Torque control	N	N Y	Not configurable by the user.	NO											
dr.11	Inch Frequency	10.00Hz	dr.19 to dr.20	Set the motor inch frequency.	YES											
dr.12	INCH acceleration time	20.0s	0.0 to 600.0s	Set the time in which the drive accelerates to reach the maximum speed.	YES											
dr.13	INCH deceleration time	30.0s	0.0 to 600.0s	Set the time in which the drive decelerates from the maximum speed until stopping.	YES											
dr.14	Motor power	(*)	0.2 kW 0.4 kW ... 30.0 kW	Set the motor rated power according to its nameplate.	NO											
dr.15	Torque boost	Manual	Manual Auto1 Auto2	Proportional to the initial voltage value applied to the motor in the start moment to overcome the resistive torque in heavy starts.	NO											
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>Manual</td><td>Starting voltage manual setting by the use of parameters dr.16 y dr.17.</td></tr><tr><td>1</td><td>Auto1</td><td rowspan="2">The drive automatically calculates the voltage to apply at the start using the motor parameters.</td></tr><tr><td>2</td><td>Auto2</td></tr></table>		OPT.	DESCR.	FUNCTION	0	Manual	Starting voltage manual setting by the use of parameters dr.16 y dr.17.	1	Auto1	The drive automatically calculates the voltage to apply at the start using the motor parameters.	2	Auto2
				OPT.		DESCR.	FUNCTION									
				0		Manual	Starting voltage manual setting by the use of parameters dr.16 y dr.17.									
				1		Auto1	The drive automatically calculates the voltage to apply at the start using the motor parameters.									
2	Auto2															
dr.16	Start torque in forward direction	+2.0%	0.0 to 15.0%	Set the start torque in forward direction.	NO											
dr.17	Start torque in reverse direction	+2.0%	0.0 to 15.0%	Set the start torque in reverse direction.	NO											
dr.18	Motor frequency	60.00Hz	30.00 to 400.00Hz	Set the base frequency (drive output frequency when running at its rated voltage) according to the motor nameplate.	NO											

(*) This value depends on the motor setting.

Screen	Description	Default value	Range	Function	Set on RUN																																								
dr.19	Start frequency	0.50Hz	0.01 to 10.00Hz	Set the start frequency. A start frequency is a frequency at which the drive starts voltage output. The drive does not produce output voltage while the frequency reference is lower than the set frequency. However, if a deceleration stop is made while operating above the start frequency, output voltage will continue until the operation frequency reaches a full-stop (0Hz).	NO																																								
dr.20	Max speed limit	60.00Hz	40.00 to 400.00 Hz	Set upper and lower frequency limits. All frequency selections are restricted to frequencies from within the upper and lower limits. This restriction also applies when you in input a frequency reference using the keypad.	NO																																								
dr.21 ^[1]	Hz/Rpm Display	Hz	Hz Rpm	Change the units used to display the operational speed of the drive by setting to 0 (Hz) or 1 (Rpm). This function is only available in the removable display.	YES																																								
dr.80	Select range	Run Freq.	0 to 17	<div>Select ranges displayed by the drive at power input.</div> <table><tr><th>OPT.</th><th>DESCR.</th><th>OPT.</th><th>DESCR.</th></tr><tr><td>0</td><td>Run Freq.</td><td>9</td><td>Motor RPM</td></tr><tr><td>1</td><td>Accel. Time</td><td>10</td><td>DC Voltage</td></tr><tr><td>2</td><td>Decel. Time</td><td>11</td><td>User Sel. 1</td></tr><tr><td>3</td><td>Cmd Source</td><td>12</td><td>Out of Order</td></tr><tr><td>4</td><td>Ref. Source</td><td>13</td><td>Sel. Run Dir.</td></tr><tr><td>5</td><td>MultiStep 1</td><td>14</td><td>Oupt. Curr. 2</td></tr><tr><td>6</td><td>MultiStep 2</td><td>15</td><td>Motor2 RPM</td></tr><tr><td>7</td><td>MultiStep 3</td><td>16</td><td>DC Voltage2</td></tr><tr><td>8</td><td>Oupt. Curr.</td><td>17</td><td>User Sel. 2</td></tr></table>	OPT.	DESCR.	OPT.	DESCR.	0	Run Freq.	9	Motor RPM	1	Accel. Time	10	DC Voltage	2	Decel. Time	11	User Sel. 1	3	Cmd Source	12	Out of Order	4	Ref. Source	13	Sel. Run Dir.	5	MultiStep 1	14	Oupt. Curr. 2	6	MultiStep 2	15	Motor2 RPM	7	MultiStep 3	16	DC Voltage2	8	Oupt. Curr.	17	User Sel. 2	YES
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[1] Displayed when an LCD keypad is in use.

Screen	Description	Default value	Range	Function	Set on RUN		
dr.81	Select monitor code	Volt V	0 to 2	Select the monitor code.	YES		
				OPT.		DESCR.	FUNCTION
				0		Volt V	Scalar control mode. Drive carries out the control applying a voltage / frequency ramp to the motor.
				1		Pot kW	Control by power.
				2		Tq kgf	Control by torque.
dr.89	Display changed parameters	All	All Chang	Displays all parameters that are different from the factory default values. Use this feature to track changed parameters.	YES		
				OPT.		DESCR.	FUNCTION
				0		All	Display all parameters.
				1		Chang	Display changed parameters.
dr.90	ESC key function	Mov. Pos. In	0 to 2	The [ESC] key is a multi-functional key that can be configured to carry out a number of different functions.	NO		
				OPT.		DESCR.	FUNCTION
				0		Mov. Pos. In.	Move to the initial position.
				1		JOG Key	Perform a jog operation.
				2		Local/Rem.	Change from Local to remote control if the key has previously been configured as such.
dr.91 [1]	Eloader function	None	0 to 2	Set Eloader function.	NO		
				OPT.		DESCR.	FUNCTION
				0		None	No actions are executed.
				1		Download	Download upgrade file.
				2	Upload	Store drive current values.	

Screen	Description	Default value	Range	Function	Set on RUN																																										
dr.93	Parameter initialization	No	No All dr bA Ad Cn In OU CM AP Pr M2 run	Set parameters back to their factory value.	NO																																										
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>No</td><td>All parameters keep their current value.</td></tr><tr><td>1</td><td>All</td><td>Initializes all parameter groups (set to factory values).</td></tr><tr><td>2</td><td>dr</td><td>Initialize group dr.</td></tr><tr><td>3</td><td>bA</td><td>Initialize group bA.</td></tr><tr><td>4</td><td>Ad</td><td>Initialize group Ad.</td></tr><tr><td>5</td><td>Cn</td><td>Initialize group Cn.</td></tr><tr><td>6</td><td>In</td><td>Initialize group In.</td></tr><tr><td>7</td><td>OU</td><td>Initialize group OU.</td></tr><tr><td>8</td><td>CM</td><td>Initialize group CM.</td></tr><tr><td>9</td><td>AP</td><td>Initialize group AP.</td></tr><tr><td>12</td><td>Pr</td><td>Initialize group Pr.</td></tr><tr><td>13</td><td>M2</td><td>Initialize group M2.</td></tr><tr><td>16</td><td>run</td><td>Initialize group Operation.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	No	All parameters keep their current value.	1	All	Initializes all parameter groups (set to factory values).	2	dr	Initialize group dr.	3	bA	Initialize group bA.	4	Ad	Initialize group Ad.	5	Cn	Initialize group Cn.	6	In	Initialize group In.	7	OU	Initialize group OU.	8	CM	Initialize group CM.	9	AP	Initialize group AP.	12	Pr	Initialize group Pr.	13	M2	Initialize group M2.	16	run	Initialize group Operation.
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				6		In	Initialize group In.																																								
				7		OU	Initialize group OU.																																								
				8		CM	Initialize group CM.																																								
				9		AP	Initialize group AP.																																								
				12		Pr	Initialize group Pr.																																								
				13		M2	Initialize group M2.																																								
				16		run	Initialize group Operation.																																								
dr.94	Password register	0	0 to 9999	Password for 'dr.95 ➔ Parameters lock'. It is set as Hexadecimal value. Note: To register a password for the first time: 1. In 'dr.94', press 'Ent' key twice. 2. Register the password (except '0') and press 'Ent' key (the value will blink). 3. Press 'Ent' key again to save the value and return to 'dr.94'. Note: To change the password, follow the next steps: 1. In 'dr.94', press 'Ent' key once. 2. Introduce the present password and press 'Ent' key again. 3. Introduce the new password and press 'Ent' key (the value will blink). 4. Press 'Ent' key again to save the value and return to 'dr.94'.	YES																																										

Screen	Description	Default value	Range	Function	Set on RUN				
dr.95	Parameters lock	0	0 to 9999	<div>This parameter is able to lock or unlock parameters by typing the password previously registered in 'dr.94 → Password register'.</div> <table><tr><td>UL (Unlock)</td><td>Parameters change enabled.</td></tr><tr><td>L (Lock)</td><td>Parameters change disabled.</td></tr></table> <div>Note: To lock and unlock parameters setting, follow the next steps: 1. In 'dr.95', press 'Ent' key once. The present status of parameters lock will appear (UL – Unlock, L – Lock). 2. Press 'Ent' key again and introduce the password registered in 'dr.94'. 3. Press 'Ent' key and immediately, the status of the parameters lock will be changed (UL → L, or L → UL). 4. Press 'Ent' key to return to 'dr.95'.</div>	UL (Unlock)	Parameters change enabled.	L (Lock)	Parameters change disabled.	YES
UL (Unlock)	Parameters change enabled.								
L (Lock)	Parameters change disabled.								
dr.97	Software version	0	0 to 9999	Displays the software version. Ex: 0xE6 = v2.30.	YES				
dr.98	IO Software version	0	0 to 65535	Displays the IO software version.	YES				
dr.99	Hardware version	0	0 to 65535	Displays the hardware version.	YES				

Group 2: Basic Functions → bA

Screen	Description	Default value	Range	Function	Set on RUN																		
bA.1	Alt Speed Ref	None	0 to 6	Select the auxiliary speed reference source for the speed sum to the main reference, according to the following table:	NO																		
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>None</td><td>The reference will be introduced by using the keypad.</td></tr><tr><td>1</td><td>V1</td><td>Reference will be introduced through the voltage analog input 1.</td></tr><tr><td>3</td><td>V2</td><td>Reference will be introduced through the voltage analog input 2.</td></tr><tr><td>4</td><td>I2</td><td>Reference will be introduced through the current analog input 2.</td></tr><tr><td>6</td><td>Pulse</td><td>Reference will be introduced through the Pulse input.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	None	The reference will be introduced by using the keypad.	1	V1	Reference will be introduced through the voltage analog input 1.	3	V2	Reference will be introduced through the voltage analog input 2.	4	I2	Reference will be introduced through the current analog input 2.	6	Pulse	Reference will be introduced through the Pulse input.
				OPT.		DESCR.	FUNCTION																
				0		None	The reference will be introduced by using the keypad.																
				1		V1	Reference will be introduced through the voltage analog input 1.																
				3		V2	Reference will be introduced through the voltage analog input 2.																
				4		I2	Reference will be introduced through the current analog input 2.																
6	Pulse	Reference will be introduced through the Pulse input.																					
bA.2 ^[2]	Aux calculation type	M+(GA)	0 to 7	Adjust the equation to calculate the speed reference. In order to do this, the present reference source, the auxiliary reference (bA.1) and the gain for this reference (bA.3) are used.	NO																		
				Notice that options 4-7 could result in references with positive or negative sign (forward or reverse operation) even when unipolar analog inputs are used.																			

[2] These parameters will only be displayed if bA.1 is not set to 0 (None)

Screen	Description	Default value	Range	Function	Set on RUN																											
				<p>The following table shows the calculation for each option, where:</p> <p>M: Main speed reference G: Auxiliary reference gain (bA.3) A: Auxiliary reference (bA.1)</p> <table><tr><th>OPT.</th><th>CALCULATION</th><th>FUNCTION</th></tr><tr><td>0</td><td>$M+(G \cdot A)$</td><td>Main ref. + (bA.3 * bA.1 * In.1)</td></tr><tr><td>1</td><td>$M \times (G \cdot A)$</td><td>Main ref. * (bA.3 * bA.1)</td></tr><tr><td>2</td><td>$M/(G \cdot A)$</td><td>Main ref. / (bA.3 * bA.1)</td></tr><tr><td>3</td><td>$M+[M \cdot (G \cdot A)]$</td><td>Main ref. + {Main ref. * (bA.3 * bA.1)}</td></tr><tr><td>4</td><td>$M+G \cdot 2(A-50\%)$</td><td>Main ref. + bA.3 * 2 * (bA.1 – 50) * In.1</td></tr><tr><td>5</td><td>$M \times [G \cdot 2(A-50\%)]$</td><td>Main ref. * (bA.3 * 2 * (bA.1 – 50))</td></tr><tr><td>6</td><td>$M/[G \cdot 2(A-50\%)]$</td><td>Main ref. / (bA.3 * 2 * (bA.1 – 50))</td></tr><tr><td>7</td><td>$M+M \cdot G \cdot 2(A-50\%)$</td><td>Main ref. + Main ref. * bA.3 * 2 * (bA.1 – 50)</td></tr></table>	OPT.	CALCULATION	FUNCTION	0	$M+(G \cdot A)$	Main ref. + (bA.3 * bA.1 * In.1)	1	$M \times (G \cdot A)$	Main ref. * (bA.3 * bA.1)	2	$M/(G \cdot A)$	Main ref. / (bA.3 * bA.1)	3	$M+[M \cdot (G \cdot A)]$	Main ref. + {Main ref. * (bA.3 * bA.1)}	4	$M+G \cdot 2(A-50\%)$	Main ref. + bA.3 * 2 * (bA.1 – 50) * In.1	5	$M \times [G \cdot 2(A-50\%)]$	Main ref. * (bA.3 * 2 * (bA.1 – 50))	6	$M/[G \cdot 2(A-50\%)]$	Main ref. / (bA.3 * 2 * (bA.1 – 50))	7	$M+M \cdot G \cdot 2(A-50\%)$	Main ref. + Main ref. * bA.3 * 2 * (bA.1 – 50)	
OPT.	CALCULATION	FUNCTION																														
0	$M+(G \cdot A)$	Main ref. + (bA.3 * bA.1 * In.1)																														
1	$M \times (G \cdot A)$	Main ref. * (bA.3 * bA.1)																														
2	$M/(G \cdot A)$	Main ref. / (bA.3 * bA.1)																														
3	$M+[M \cdot (G \cdot A)]$	Main ref. + {Main ref. * (bA.3 * bA.1)}																														
4	$M+G \cdot 2(A-50\%)$	Main ref. + bA.3 * 2 * (bA.1 – 50) * In.1																														
5	$M \times [G \cdot 2(A-50\%)]$	Main ref. * (bA.3 * 2 * (bA.1 – 50))																														
6	$M/[G \cdot 2(A-50\%)]$	Main ref. / (bA.3 * 2 * (bA.1 – 50))																														
7	$M+M \cdot G \cdot 2(A-50\%)$	Main ref. + Main ref. * bA.3 * 2 * (bA.1 – 50)																														
bA.3 ^[2]	Auxiliary reference gain	1000%	-200.0 to 200.0%	Adjust a gain to the auxiliary reference configured in parameter.	YES																											

Screen	Description	Default value	Range	Function	Set on RUN																		
bA.4	Control mode 2	1	0 to 4	Set the alternative control mode to command the drive (Start/Stop, Reset...).	NO																		
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>LOCAL</td><td>Drive is controlled from the keypad.</td></tr><tr><td>1</td><td>REMOTE</td><td>Commands are sent from the control terminals.</td></tr><tr><td>2</td><td>REMOTE 2</td><td>Commands are sent from the control 2 terminals.</td></tr><tr><td>3</td><td>MODBUS</td><td>The drive is controlled through the communications bus, integrated in the equipment.</td></tr><tr><td>4</td><td>COMMS</td><td>The drive control is carried out by the use of any of the optional communication boards.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	LOCAL	Drive is controlled from the keypad.	1	REMOTE	Commands are sent from the control terminals.	2	REMOTE 2	Commands are sent from the control 2 terminals.	3	MODBUS	The drive is controlled through the communications bus, integrated in the equipment.	4	COMMS	The drive control is carried out by the use of any of the optional communication boards.
				OPT.		DESCR.	FUNCTION																
				0		LOCAL	Drive is controlled from the keypad.																
				1		REMOTE	Commands are sent from the control terminals.																
				2		REMOTE 2	Commands are sent from the control 2 terminals.																
				3		MODBUS	The drive is controlled through the communications bus, integrated in the equipment.																
4	COMMS	The drive control is carried out by the use of any of the optional communication boards.																					
bA.5	Speed reference source 2	LOCAL	0 to 12	Select the alternative source for the speed and torque reference respectively.	YES																		
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>LOCAL</td><td>Reference will be given by keypad and will be set in dr.1.</td></tr><tr><td>2</td><td>V1</td><td>Reference will be introduced through the voltage analog input 1.</td></tr><tr><td>4</td><td>V2</td><td>Reference will be introduced through the voltage analog input 2.</td></tr><tr><td>5</td><td>I2</td><td>Reference will be introduced through the current analog input 2.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	LOCAL	Reference will be given by keypad and will be set in dr.1.	2	V1	Reference will be introduced through the voltage analog input 1.	4	V2	Reference will be introduced through the voltage analog input 2.	5	I2	Reference will be introduced through the current analog input 2.			
				OPT.		DESCR.	FUNCTION																
				0		LOCAL	Reference will be given by keypad and will be set in dr.1.																
				2		V1	Reference will be introduced through the voltage analog input 1.																
				4		V2	Reference will be introduced through the voltage analog input 2.																
				5		I2	Reference will be introduced through the current analog input 2.																
Note: Continues in the next page																							

Screen	Description	Default value	Range	Function	Set on RUN		
bA.6	Alternative torque reference	LOCAL		Note: comes from the previous page.	YES		
				OPT.		DESCR.	FUNCTION
				6		MODBUS	The reference will be introduced through Modbus.
				8		COMMS	The reference will be introduced through communications.
				9		PLC	The common area can be linked with user sequence output and can be used as command.
				12		PULSE	Reference will be introduced through the Pulse input.
bA.7	V/F Pattern	Linear	0 to 3	Set the alternative acceleration ramp.	NO		
				OPT.		DESCR.	FUNCTION
				0		Linear	Output voltage increases and decreases at constant rate proportional to voltage/frequency (V/F) relation. Used to achieve a constant torque load regardless the frequency.
				1		Square	Output voltage increases quadratically with a proportion of 1.5.
				2		V/F Us	Define a customized V/F pattern.
				3		Square2	Output voltage increases quadratically with a proportion of 2.

Screen	Description	Default value	Range	Function	Set on RUN												
bA.8	Acceleration ramp type	MaxFreq	MaxFreq FrqDelta	Enables the acceleration ramp setting:	NO												
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>MaxFreq</td><td>Allows accelerating or decelerating with the same ramp based on the maximum frequency, independently from the operating frequency.</td></tr><tr><td>1</td><td>FrqDelta</td><td>Allows defining the accelerating/decelerating time which will reach the next speed reference when working at constant speed.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	MaxFreq	Allows accelerating or decelerating with the same ramp based on the maximum frequency, independently from the operating frequency.	1	FrqDelta	Allows defining the accelerating/decelerating time which will reach the next speed reference when working at constant speed.			
				OPT.		DESCR.	FUNCTION										
0	MaxFreq	Allows accelerating or decelerating with the same ramp based on the maximum frequency, independently from the operating frequency.															
1	FrqDelta	Allows defining the accelerating/decelerating time which will reach the next speed reference when working at constant speed.															
bA.9	Time scale	01s	0.01s 0.1s 1s	Set the time scale for all time-related values. It is particularly useful when a more accurate Acc/Dec times are required because of load characteristics, or when the maximum time range needs to be extended.	NO												
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>0.01s</td><td>minimum unit: 0.01 s</td></tr><tr><td>1</td><td>0.1s</td><td>minimum unit: 0.1 s</td></tr><tr><td>2</td><td>1s</td><td>minimum unit: 1 s</td></tr></table>		OPT.	DESCR.	FUNCTION	0	0.01s	minimum unit: 0.01 s	1	0.1s	minimum unit: 0.1 s	2	1s	minimum unit: 1 s
				OPT.		DESCR.	FUNCTION										
0	0.01s	minimum unit: 0.01 s															
1	0.1s	minimum unit: 0.1 s															
2	1s	minimum unit: 1 s															
bA.10	Input Frequency	60Hz	60Hz 50Hz	Set the input frequency. If the frequency changes, so do all related settings (base frequency, maximum frequency...).	NO												
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>60Hz</td><td>Set drive frequency to 60Hz.</td></tr><tr><td>1</td><td>50Hz</td><td>Set drive frequency to 50Hz.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	60Hz	Set drive frequency to 60Hz.	1	50Hz	Set drive frequency to 50Hz.			
				OPT.		DESCR.	FUNCTION										
0	60Hz	Set drive frequency to 60Hz.															
1	50Hz	Set drive frequency to 50Hz.															
bA.11	Pole Number	(*)	2 to 48	Set the number of poles in the motor according to its nameplate.	NO												
bA.12	Rated Slip	(*)	0 to 3000rpm	When a heavy load produces a big slip during the start, configure this parameter to compensate the motor slip.	NO												

Screen	Description	Default value	Range	Function	Set on RUN
bA.13	Motor Current	(*)	1.0 to 1000.0A	Set the motor nominal current in accordance with the nameplate.	NO
bA.14	No load Current	(*)	0.5 to 200.0A	Set the measured current at rated frequency without load. If any difficulties are found when measuring the current without load, this setting should be between 30% and 50% of the motor nameplate rated current.	NO
bA.15	Motor Voltage	0V	170 to 480V	Set the motor rated voltage according to its nameplate.	NO
bA.16	Efficiency	(*)	64 to 100%	Set the motor efficiency according to its nameplate.	NO
bA.17	Inertia Rate	0	0 to 8	Select load inertia based on motor inertia.	NO
				OPT. FUNCTION	
				0 Less than 10 times motor inertia	
				1 10 times motor inertia	
				2-8 More than 10 times motor inertia	
bA.18	Output power adjustment	+100	70 to 130%	Fine adjustment of the output power calculation, increasing its value if it is lower than expected or reducing it to match the real value.	YES
bA.19	Input voltage	380V	170 to 240V 320 to 480V	Set the input voltage. Note: The default setting value and this parameter range will vary depending on the drive supply voltage: 220V → 220 400V → 380	YES

(*) This value depends on the motor setting.

Screen	Description	Default value	Range	Function	Set on RUN		
bA.20	Auto tuning	None	0 to 7	Set auto tuning type:	NO		
				OPT.		DESCR.	FUNCTION
				0		None	Auto-tuning is not active
				1		All	The motor parameters are measured with the motor rotating. The stator resistance (Rs), leak inductance (Lσ), stator inductance (Ls), no-load current and rotor time constant are all measured. The encoder state is also measured. The encoder related functions should be rightly set. If load is connected to the motor axis, the parameter might not be correctly measured so remove the load before measurement.
				2		Allst	Motor parameters are measured when the motor is stopped. Stator resistance (Rs), leak inductance (Lσ) and rotor time constant are measured at the same time.
3	Rs+Lsig	The parameter is measured with the motor stopped. The measured values are used for auto torque boost and sensorless vector control.					
NOTE: Continues on the next page.							

Screen	Description	Default value	Range	Function	Set on RUN
bA.20	Auto tuning	None	0 to 7	NOTE: Comes from the previous page.	
				OPT.	DESCR.
				6	Tr
				7	All PM
bA.21	Stator Resistor	0 (*)	(*)	Stator resistor fine setting.	NO
bA.22	Leak Inductor	0mH (*)	(*)	Leak inductor fine setting.	NO
bA.23	Stator Inductor	0mH (*)	(*)	Inductor stator fine setting.	NO
bA.24 [3]	Rotor Time Const	145ms	25 to 5000ms	Rotor time constant fine setting.	NO
bA.25 [3]	Stator inductance scale.	100%	50 to 150%	Set stator inductance scale.	NO
bA.26 [3]	Rotor time constant scale.	100%	50 to 150%	Set rotor time constant scale.	NO
bA.31 [3]	Regeneration inductance scale	80%	70 to 100%	Set regeneration inductance scale.	NO
bA.32	Q-axis inductance scale	100%	50 to 100%	Adjust the inductance scale of the reactive energy axis, Q, for the synchronous motors permanent magnet motor control. Note: Visible parameter if dr.9 = PM Sensorless	NO

[3] These parameters will only be displayed if dr.9 is set to 4 (S-less1).

(*) This value depends on the motor setting.

Screen	Description	Default value	Range	Function	Set on RUN
bA.34	Auto tuning level for Ld and Lq	33.3%	20.0 to 50.0%	Adjusts the autotuning level for Ld (active energy axis) and Lq (reactive energy axis), for the synchronous motors permanent magnet motor control. Note: Visible parameter if dr.9 = PM Sensorless	NO
bA.35	Frecuencia de autoajuste para Ld y Lq	100.0%	80.0–150.0%	Adjusts the frequency of autotuning for Ld (active energy axis) and Lq (reactive energy axis), for the synchronous motors permanent magnet motor control. Note: Visible parameter if dr.9 = PM Sensorless	NO
bA.41 [4]	User Frequency 1	1500Hz	0.00 to dr.20	Set user frequency 1. When the output frequency reaches this value, the drive will provide the voltage set in parameter bA.42.	NO
bA.42 [4]	User Voltage 1	25%	0 to 100%	Set user voltage 1. The drive will provide the frequency set in parameter when the frequency configured in bA.41 is reached.	NO
bA.43 [4]	User Frequency 2	3000Hz	0.00 to dr.20	Set user frequency 2. When the output frequency reaches this value, the drive will provide the voltage set in parameter bA.44.	NO
bA.44 [4]	User Voltage 2	50%	0 to 100%	Set user voltage 2. The drive will provide the frequency set in parameter when the frequency configured in bA.43 is reached.	NO
bA.45 [4]	User Frequency 3	4500Hz	0.00 to dr.20	Set user frequency 3. When the output frequency reaches this value, the drive will provide the voltage set in parameter bA.46.	NO
bA.46 [4]	User Voltage 3	75%	0 to 100%	Set user voltage 3. The drive will provide the frequency set in parameter when the frequency configured in bA.45 is reached.	NO
bA.47 [4]	User Frequency 4	000Hz	0.00 to dr.20	Set user frequency 4. When the output frequency reaches this value, the drive will provide the voltage set in parameter bA.48.	NO

[4] These parameters will only be displayed if bA.7 or M2.25 are set to 2 (V/F Us).

Screen	Description	Default value	Range	Function	Set on RUN
bA.48 [4]	User Voltage 4	0%	0 to 100%	Set user voltage 4. The drive will provide the frequency set in parameter when the frequency configured in bA.47 is reached.	NO
St1 [1]	Multi-Reference1	1000%	0.00 to dr.20	The user can set multiple speed references for the drive. This will be enabled by the use of the digital inputs configured as speed multi-references.	YES
St2 [1]	Multi-Reference2	2000 %			YES
St3 [1]	Multi-Reference3	3000%		The speed applied in each situation will depend on the digital inputs that control the multi-references, which are set as SPEED-L, SPEED-M and SPEED-H.	YES
bA.53 [5]	Multi-Reference4	4000%			YES
bA.54 [5]	Multi-Reference5	5000%		For example, with the following options: - In.65 ED1 = 'Speed-H' - In.65 ED2 = 'Speed -M' - In.65 ED3 = 'Speed-L'	YES
bA.55 [5]	Multi-Reference6	6000%		The adjustment is carried out by assigning a speed value for every parameter within this group, from St1-St3 and bA53-bA.56. The following table links the digital inputs configured as SPEED to the selected multi-reference:	YES

[1] Displayed when an LCD keypad is in use.

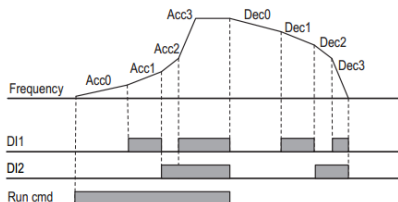
[5] These parameters will only be displayed if one of In.65-In71 is set to SPEED-L/M/H.

Screen	Description	Default value	Range	Function					Set on RUN
bA.56 [5]	Multi-Reference7	6000%		DIGITAL OUTPUT: Speed			MULTI REFERENCE	PARAM.	YES
				H	M	L			
				0	0	X	Multi-reference 1	St1	
				0	X	0	Multi-reference 2	St2	
				0	X	X	Multi-reference 3	St3	
				X	0	0	Multi-reference 4	bA.53	
				X	0	X	Multi-reference 5	bA.54	
				X	X	0	Multi-reference 6	bA.55	
				X	X	X	Multi-reference 7	bA.56	
				Note: 0: Inactive and X: Active.					
bA.70	Acceleration ramp 2	20.0s	0.0 to 600.0s	The user can set different acceleration and deceleration ramps for the drive. In order to do this, parameters bA.70-82 must be configured and the acceleration and deceleration times entered (parameters ACC and dEC from group "Operation"). The established setting within the parameter is the time required to reach the maximum frequency value, starting from 0Hz (or to reduce the frequency according to the deceleration times). These ramps will be set according to the process necessities.					YES
bA.71	Deceleration ramp 2	30.0s							YES
bA.72 [6]	Acceleration ramp 3	20.0s							YES
bA.73 [6]	Deceleration ramp 3	30.0s							YES
bA.74 [6]	Acceleration ramp 4	20.0s							YES
bA.75 [6]	Deceleration ramp 4	30.0s							YES
bA.76 [6]	Acceleration ramp 5	20.0s							YES
bA.77 [6]	Deceleration ramp 5	30.0s							YES
Note: continues on the next page.									

[5] These parameters will only be displayed if one of In.65-In71 is set to SPEED-L/M/H.

[6] These parameters will only be shown if one of parameters In.65-In71 is set to ACC/DEC-B/M/H.

Screen	Description	Default value	Range	Function	Set on RUN
bA.78 [6]	Acceleration ramp 6	20.0s		<p>Note: comes from the previous page</p> <p>The setting is carried out by assigning a speed value for each parameter of this group:</p> <ul style="list-style-type: none"> - bA.70 to bA.82: for acceleration times. - bA.71 to bA.83: for deceleration times. <p>Once multi-function terminals have been configured (In.65-71) as Speed-L/M/H (options 11, 12 and 49), acceleration and deceleration commands will control the drive operation based on the setting of bA.70-83.</p> <p>For example, with the following options the drive will operate as shown in the following Figure Ramp operation example.</p> <ul style="list-style-type: none"> - In.65 ED1 = 'Speed-L' - In.65 ED2 = 'Speed-M' 	YES
bA.79 [6]	Deceleration ramp 6	30.0s			YES
bA.80 [6]	Acceleration ramp 7	20.0s			YES
bA.81 [6]	Deceleration ramp 7	30.0s			YES
bA.82 [6]	Acceleration ramp 8	20.0s			YES
bA.83 [6]	Deceleration ramp 8	30.0s			YES



Ramp operation example

Group 3: Expanded Functions → Ad

Screen	Description	Default value	Range	Function	Set on RUN						
Ad.1	Acceleration pattern	Linear	Linear S-curve	Set the type of acceleration and deceleration depending on the application:	NO						
Ad.2	Deceleration pattern			<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>Linear</td><td>The output frequency is constant and increases/ decreases linearly.</td></tr><tr><td>1</td><td>S-curve</td><td>Used in applications which require a soft acceleration/ deceleration, such as lifting loads. The S curve index can be set from parameters Ad.3-Ad.6.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	Linear	The output frequency is constant and increases/ decreases linearly.
OPT.	DESCR.	FUNCTION									
0	Linear	The output frequency is constant and increases/ decreases linearly.									
1	S-curve	Used in applications which require a soft acceleration/ deceleration, such as lifting loads. The S curve index can be set from parameters Ad.3-Ad.6.									
Ad.3 ^[7]	S curve start acceleration slope	40%	1 to 100%	Set the curve whenever the acceleration/deceleration pattern is defined as S curve. It is used to set the S curve curvilinear relation when starting the acceleration.	NO						
Ad.4 ^[7]	S curve stop acceleration slope	40%	1 to 100%	Set the curve's ramp once the acceleration/deceleration pattern has been defined as S Curve. It is used to set the S Curve curvilinear relation when ending the acceleration.	NO						
Ad.5 ^[8]	S curve start deceleration slope	40%	1 to 100%	Set the curve whenever the acceleration/deceleration pattern is defined as S curve. It is used to set the S curve curvilinear relation when starting the deceleration.	NO						
Ad.6 ^[8]	S curve stop deceleration slope	40%	1 to 100%	Set the curve's ramp once the acceleration/deceleration pattern has been defined as S Curve. It is used to set the S Curve curvilinear relation when ending the deceleration.	NO						

[7] These parameters will only be displayed if Ad.1 is set to 1 (S-curve).

[8] These parameters will only be displayed if Ad.2 is set to 1 (S-curve).

Screen	Description	Default value	Range	Function			Set on RUN
Ad.7	Motor start mode	RAMP	RAMP DCSTART	Define the motor start mode.			NO
				OPT.	DESCR.	FUNCTION	
				0	RAMP	The drive will start applying a frequency ramp to the motor	
				1	DC START	Allows accelerating after having stopped the motor by the use of the DC Brake. It can also be used after a normal brake whenever some torque is needed after opening the external brake. To configure this option, see parameters Ad.12 y Ad.13.	

Screen	Description	Default value	Range	Function			Set on RUN
Ad.8	Stop mode	RAMP	0 to 4	Select the drive main stop mode. This value should be adequate for each application.			NO
				OPT.	DESCR.	FUNCTION	
				0	RAMP	The drive will stop applying a frequency ramp to stop the motor.	
				1	DC BRAKE	The drive will apply DC to stop the motor. To configure this option, see parameters from Ad.14 to Ad.17.	
				2	SPIN	The drive will cut the motor output supply, stopping due to inertia.	
			4	POW BRKE	The drive will stop the motor as soon as possible by controlling the regenerative energy to avoid an overvoltage fault. This option may increase or decrease the deceleration time according to the inertia of the load. Note: Do not use this option in applications with frequent acceleration / deceleration. It could cause overheating.		
Ad.9	Allow speed inversion	None	None FWDPre v REVPrev	Invert motor speed. This function helps to prevent the motor from rotating in inverse direction.			NO
				OPT.	DESCR.	FUNCTION	
				0	None	The motor can spin in both directions.	
				1	FWDPre v	Motor cannot rotate clockwise.	
			2	RevPrev	Motor cannot rotate anti clockwise.		

Screen	Description	Default value	Range	Function	Set on RUN									
Ad.10	Power-on Run	N	NO YES	This parameter allows operating the drive if once powered up the start command is already present.	YES									
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>NO</td><td>The drive will NOT operate if the start command is present on power up. To operate, a stop command should previously be sent.</td></tr><tr><td>1</td><td>YES</td><td>The drive starts after powering up.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	NO	The drive will NOT operate if the start command is present on power up. To operate, a stop command should previously be sent.	1	YES	The drive starts after powering up.
				OPT.		DESCR.	FUNCTION							
0	NO	The drive will NOT operate if the start command is present on power up. To operate, a stop command should previously be sent.												
1	YES	The drive starts after powering up.												
Ad.12 [9]	Time to DC start	0.00s	0.00 to 60.00s	Set the time during which the equipment applies DC voltage before starting to accelerate when the equipment is set in DC start mode. To enable the DC start, parameter Ad.7 must be set to 'DCSTART'.	NO									
Ad.13	Current injection DC start	50%	0 to 200%	Set the start current level when the equipment is set in DC START mode. To enable DC start option, parameter Ad.7 must be set to 'DCSTART'.	NO									
Ad.14 [10]	Pre-DC brake time	0.10s	0.00 to 60.00s	Set the time before starting the DC Brake. Once the frequency is below the value adjusted in parameter Ad.17 the drive will wait this time before starting the DC Brake operation.	NO									
Ad.15 [10]	DC brake time	1.00s	0.00 to 60.00s	Set the DC Brake operation time.	NO									
Ad.16 [10]	Current level DC brake	50%	0 to 200%	Set the current level which will be applied to the motor in percentage of the motor rated current during DC Brake operation.	NO									

[9] This parameter will only be displayed if Ad.7 is set to 1 (DCSTART).

[10] These parameters will only be displayed if Ad.8 is set to 1 (DCBRAKE).

Screen	Description	Default value	Range	Function	Set on RUN									
Ad.17 [10]	Frequency start DC brake	5.00Hz	dr.19 to 60.00	Set the frequency value at which the drive will enable the DC brake. The DC Brake operation will start once the frequency is below this value and the time set in parameter Ad.14 has elapsed.	NO									
Ad.20	Acceleration dwell frequency	5.00Hz	dr.19 to dr.20	During the acceleration process, the drive will pause at this frequency, keeping it constant during the time set in parameter Ad.21.	NO									
Ad.21	Acceleration dwell time	0.0s	0.0 to 60.0s	During the acceleration process, this parameter allows to define during how long the drive will operate at the constant frequency set in parameter Ad.20.	NO									
Ad.22	Deceleration dwell frequency	5.00Hz	dr.19 to dr.20	During the deceleration process, the drive will pause at this frequency value, remaining constant during the time period established in parameter Ad.23.	NO									
Ad.23	Deceleration dwell time	0.0s	0.0 to 60.0s	During the deceleration process, this parameter allows to set how long will the drive be operating at the constant frequency set in parameter Ad.22.	NO									
Ad.24	Use frequency limit	N	NO YES	<div>Enable or disable the frequency limit.</div> <table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>NO</td><td>Frequency limit disabled.</td></tr><tr><td>1</td><td>YES</td><td>Frequency limit enabled.</td></tr></table>	OPT.	DESCR.	FUNCTION	0	NO	Frequency limit disabled.	1	YES	Frequency limit enabled.	NO
OPT.	DESCR.	FUNCTION												
0	NO	Frequency limit disabled.												
1	YES	Frequency limit enabled.												
Ad.25 [11]	Frequency lower limit	0.50Hz	0.00 to Ad.26	Set the lower frequency limit if parameter Ad.24 is set as YES.	YES									
Ad.26 [11]	Frequency higher limit	dr.20 Hz [11]	Ad.25 to dr.20	Set the upper frequency limit whenever parameter Ad.24 is set as YES.	NO									

[10] These parameters will only be displayed if Ad.8 is set to 1 (DCBRAKE).

[11] These parameters will only be displayed if Ad.24 is set to 1 (YES).

Screen	Description	Default value	Range	Function	Set on RUN									
Ad.27	Jump frequency activation	NO	NO YES	<div>The user can enable or disable a band of jump frequencies to avoid resonance frequencies or other frequency types that the motor will avoid as references. The drive will pass these frequencies during the speed changes (acceleration and/or deceleration) but will not operate within these values.</div> <table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>NO</td><td>Disable the frequency jump function.</td></tr><tr><td>1</td><td>YES</td><td>Enable the frequency jump function.</td></tr></table>	OPT.	DESCR.	FUNCTION	0	NO	Disable the frequency jump function.	1	YES	Enable the frequency jump function.	NO
OPT.	DESCR.	FUNCTION												
0	NO	Disable the frequency jump function.												
1	YES	Enable the frequency jump function.												
Ad.28 [12]	Lower limit jump frequency 1	10.00Hz	0.00 to Ad.29	Set the frequency jump 1 lower limit.	YES									
Ad.29 [12]	Upper limit jump frequency 1	15.00Hz	Ad.28 to dr.20	Set the frequency jump 1 upper limit.	YES									
Ad.30 [12]	Lower limit jump frequency 2	20.00Hz	0.00 to Ad.31	Set the frequency jump 2 lower limit.	YES									
Ad.31 [12]	Upper limit jump frequency 2	25.00Hz	Ad.30 to dr.20	Set the frequency jump 2 upper limit.	YES									
Ad.32 [12]	Lower limit jump frequency 3	30.00Hz	0.00 to Ad.33	Set the frequency jump 3 lower limit.	YES									
Ad.33 [12]	Upper limit jump frequency 3	35.00Hz	Ad.32 to dr.20	Set the frequency jump 3 upper limit.	YES									
Ad.41 [13]	Open brake current	50.0%	0.0 to 180.0%	Set the output current at which the drive will open the relay configured as 'BRCtrl'. See parameter OU.1.	NO									

[12] These parameters will only be displayed if Ad.27 is set to 1 (YES).

[13] These parameters will only be displayed if either 'OU.31 u OU.33 is set to BRCtrl.

Screen	Description	Default value	Range	Function	Set on RUN												
Ad.42 [13]	Delay before brake opening	1.00s	0.00 to 10.00s	Once the motor current is greater than the one set in parameter Ad.41 and the frequency reached in the motor is the same as the one set in parameter Ad.44, the drive will open the relay configured as 'BRCtrl' and will keep this speed during the time established in this parameter.	NO												
Ad.44 [13]	Brake opening forward frequency	1.00Hz	0.00 to dr.20	Set the brake opening frequency of the relay configured as 'BRCtrl' while the motor is accelerating in positive direction.	NO												
Ad.45 [13]	Brake opening reverse frequency	1.00Hz	0.00 to dr.20	Set the brake opening frequency of the relay configured as 'BRCtrl' while the motor is accelerating in negative direction.	NO												
Ad.46 [13]	Delay before brake closing	1.00s [13]	0.00 to 10.00s	Once the motor has reached the frequency set in Ad.47, the drive will close the braking relay and will keep this speed during the time established in this parameter.	NO												
Ad.47 [13]	Brake closing frequency	2.00Hz	0.00 to dr.20	Set the frequency value at which the braking relay will stop operating, allowing the closed brake function.	NO												
Ad.50	Minimum flux mode	NONE	0 to 2	Set the minimum flux that the motor can employ to operate under low load conditions. With this optimized flux system, noises and power losses will be reduced due to the automatic flux level arrangement. The following table shows the different available configurations:	NO												
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>NONE</td><td>No action is executed</td></tr><tr><td>1</td><td>MANU</td><td>Selects the manual mode. If the output current is lower than the parameter bA.14 (no load motor current), output voltage will be reduced in the magnitude set in parameter Ad.51.</td></tr><tr><td>2</td><td>AUTO</td><td>Selects the automatic mode. The output voltage is set taking into account the motor rated current set in bA.13 and bA.14.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	NONE	No action is executed	1	MANU	Selects the manual mode. If the output current is lower than the parameter bA.14 (no load motor current), output voltage will be reduced in the magnitude set in parameter Ad.51.	2	AUTO	Selects the automatic mode. The output voltage is set taking into account the motor rated current set in bA.13 and bA.14.
				OPT.		DESCR.	FUNCTION										
				0		NONE	No action is executed										
1	MANU	Selects the manual mode. If the output current is lower than the parameter bA.14 (no load motor current), output voltage will be reduced in the magnitude set in parameter Ad.51.															
2	AUTO	Selects the automatic mode. The output voltage is set taking into account the motor rated current set in bA.13 and bA.14.															

Screen	Description	Default value	Range	Function	Set on RUN												
Ad.51 [14]	Minimum flux level in manual mode	0%	0 to 30%	Set the output voltage reducing magnitude if parameter Ad.50 is set to 'MANU'.	YES												
Ad.60	Acceleration dwell frequency	0.00Hz	0.00 to dr.20	Set the frequency at which the drive will change the acceleration ramps, from the standard to those configured in bA.70 and bA.71. See Figure Acceleration dwell frequency	NO												
Ad.64	Fan operating mode	Run	0 to 2	Choose the fan operating mode. <table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>During Run</td><td>The drive fans will connect with the start command and disconnect three minutes after the drive stops.</td></tr><tr><td>1</td><td>Always ON</td><td>The fans are permanently working whenever the drive is powered.</td></tr><tr><td>2</td><td>Temp Ctrl</td><td>The fan will connect when the temperature in the heat sink reaches the preset control temperature.</td></tr></table>	OPT.	DESCR.	FUNCTION	0	During Run	The drive fans will connect with the start command and disconnect three minutes after the drive stops.	1	Always ON	The fans are permanently working whenever the drive is powered.	2	Temp Ctrl	The fan will connect when the temperature in the heat sink reaches the preset control temperature.	YES
OPT.	DESCR.	FUNCTION															
0	During Run	The drive fans will connect with the start command and disconnect three minutes after the drive stops.															
1	Always ON	The fans are permanently working whenever the drive is powered.															
2	Temp Ctrl	The fan will connect when the temperature in the heat sink reaches the preset control temperature.															
Ad.65	Save motorized potentiometer frequency	N	NO YES	Automatically save the speed reference defined by the motorized potentiometer. <table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>NO</td><td>Speed reference is not saved.</td></tr><tr><td>1</td><td>YES</td><td>The speed reference is saved in the memory.</td></tr></table>	OPT.	DESCR.	FUNCTION	0	NO	Speed reference is not saved.	1	YES	The speed reference is saved in the memory.	YES			
OPT.	DESCR.	FUNCTION															
0	NO	Speed reference is not saved.															
1	YES	The speed reference is saved in the memory.															

[14] These parameters will only be displayed if Ad.50 is different than 'NONE'.

Screen	Description	Default value	Range	Function	Set on RUN																		
Ad.66	Select comparator source	None	0 to 6	The comparator source can be set according to the following table:	NO																		
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>None</td><td>There is no source for the comparator</td></tr><tr><td>1</td><td>V1</td><td>Voltage analog input 1 will be used as source by the comparator.</td></tr><tr><td>3</td><td>V2</td><td>Voltage analog input 2 will be used as source by the comparator.</td></tr><tr><td>4</td><td>I2</td><td>Current analog input 2 will be used as source by the comparator.</td></tr><tr><td>6</td><td>Pulse</td><td>Pulse input will be used as source by the comparator.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	None	There is no source for the comparator	1	V1	Voltage analog input 1 will be used as source by the comparator.	3	V2	Voltage analog input 2 will be used as source by the comparator.	4	I2	Current analog input 2 will be used as source by the comparator.	6	Pulse	Pulse input will be used as source by the comparator.
				OPT.		DESCR.	FUNCTION																
				0		None	There is no source for the comparator																
				1		V1	Voltage analog input 1 will be used as source by the comparator.																
				3		V2	Voltage analog input 2 will be used as source by the comparator.																
4	I2	Current analog input 2 will be used as source by the comparator.																					
6	Pulse	Pulse input will be used as source by the comparator.																					
Ad.67	Output activation level comparator mode	90.00%	Ad.68 to 100.00	Define the level to compare with the source selected in parameter Ad.66. In case this level is over passed, one of the digital outputs adjusted as 34 'COMPARAT' will enable it. See parameters OU.31 to OU.33.	NO																		
				Ad.68		Output deactivation level comparator mode	10.00%	-100.00 to Ad.67	Define the level to compare with the source selected in parameter Ad.66. In case this level is over passed, one of the digital outputs adjusted as 34 'COMPARAT' will disable it. See parameters OU.31 to OU.33.														
Ad.70	Safe operation selection	Always Enable	Always Enable DI Dependent	Configure safe operation mode. With it, the drive operates if it has permissions to do so.	NO																		
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>Always Enable</td><td>The drive responds to any start command without requiring further permissions.</td></tr><tr><td>1</td><td>DI Dependent</td><td>The drive will only operate if the digital input configured as '13 RUNEnable' is active.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	Always Enable	The drive responds to any start command without requiring further permissions.	1	DI Dependent	The drive will only operate if the digital input configured as '13 RUNEnable' is active.									
				OPT.		DESCR.	FUNCTION																
0	Always Enable	The drive responds to any start command without requiring further permissions.																					
1	DI Dependent	The drive will only operate if the digital input configured as '13 RUNEnable' is active.																					

Screen	Description	Default value	Range	Function	Set on RUN												
Ad.71 [15]	Safe operation stop	Free-Run	Free-Run Q-Stop Q-Stop Res	Set the operation of the drive when the multi-function input terminal in safe operation mode is off.	NO												
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>Free-Run</td><td>Blocks the drive output when the multifunction terminal is off.</td></tr><tr><td>1</td><td>Q-Stop</td><td>If the digital input configured as '13 RUNEnable' is disabled when the drive is operating, the drive decelerates according to the ramp defined in parameter Ad.72. To establish again the start command, the input has to be enabled while the drive is stopped.</td></tr><tr><td>2</td><td>Q-Stop Res</td><td>If the digital input configured as '13 RUNEnable' is disabled when the drive is operating, the drive decelerates according to the ramp defined in parameter Ad.72. If once the permission digital input is reset the start command is present, the drive will start normally.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	Free-Run	Blocks the drive output when the multifunction terminal is off.	1	Q-Stop	If the digital input configured as '13 RUNEnable' is disabled when the drive is operating, the drive decelerates according to the ramp defined in parameter Ad.72. To establish again the start command, the input has to be enabled while the drive is stopped.	2	Q-Stop Res	If the digital input configured as '13 RUNEnable' is disabled when the drive is operating, the drive decelerates according to the ramp defined in parameter Ad.72. If once the permission digital input is reset the start command is present, the drive will start normally.
				OPT.		DESCR.	FUNCTION										
				0		Free-Run	Blocks the drive output when the multifunction terminal is off.										
1	Q-Stop	If the digital input configured as '13 RUNEnable' is disabled when the drive is operating, the drive decelerates according to the ramp defined in parameter Ad.72. To establish again the start command, the input has to be enabled while the drive is stopped.															
2	Q-Stop Res	If the digital input configured as '13 RUNEnable' is disabled when the drive is operating, the drive decelerates according to the ramp defined in parameter Ad.72. If once the permission digital input is reset the start command is present, the drive will start normally.															
Figure Safe operation stop illustrates the drive stop mode depending on the chosen option.																	
Ad.72 [15]	Q-Stop Time	5.0s	0.0 to 600.0s	Set the deceleration time when Ad.71 is set to 1 (Q-Stop) or 2 (Q-Stop Res).	YES												

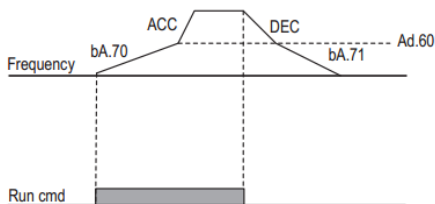
[15] These parameters will only be displayed if Ad.70 is set to 1 (DI DEPENDENT).

Screen	Description	Default value	Range	Function	Set on RUN
Ad.74	Enable regeneration prevention	N	N S	Enable regeneration prevention. When this situation occurs, the drive will increase the output frequency to prevent a fault due to overvoltage in the DC link. With this parameter, the drive helps the dynamic brake unit to avoid regeneration situations when the drive operates at normal speed.	NO
Ad.75	Regeneration prevention level	700V	300 to 800V	Set the voltage level in the DC link voltage at which the algorithm will start increasing the speed.	NO
				Figure Regeneration prevention level illustrates this function. Note: The default value and parameter range will vary depending on the drive supply voltage: 220V → 300 to 400V 380V → 600 to 800V	NO
Ad.76 [16]	Compare frequency limit	1.00Hz	0.00 to 10.00Hz	Set the alternative frequency width to be used by the algorithm when the voltage level set in parameter Ad.75 is overcome during regeneration prevention.	NO
Ad.77 [16]	P gain regeneration prevention	50.0%	0.0 to 100.0%	To prevent regeneration zone, set P/I gain in the DC link voltage suppress PI controller.	YES
Ad.78 [16]	I gain regeneration prevention	50.0ms	0.0 to 3000.0ms	Note: Press regeneration prevention does not operate during accelerations or decelerations; it only operates during constant speed motor operation. When regeneration prevention is activated, output frequency may change within the range set at Ad.76.	YES

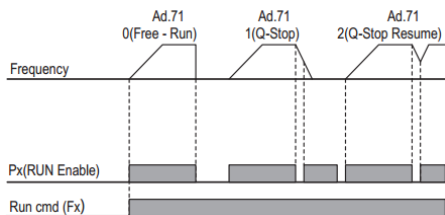
[16] Displayed when Ad.74 is set to 1 (YES).

Screen	Description	Default value	Range	Function	Set on RUN												
Ad.80 [17]	Fire mode selection	None	None Fire Mode Fire Mode Test	<p>Fire mode forces the drive to ignore all minor faults and resets and restarts with major faults without considering the number of retry attempts. This action is performed until equipment destruction if necessary.</p> <p>The drive runs in Fire mode when this parameter is set to '1 (Fire Mode)', and the multifunction terminal (In. 65-71) configured for Fire mode is turned on.</p> <table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>None</td><td>Fire mode is off</td></tr><tr><td>1</td><td>Fire Mode</td><td>Fire mode enabled. When the digital input configured as 'Fire Mode', the drive will start working in this mode, at the frequency configured in Ad.81 and the direction set in Ad.82.</td></tr><tr><td>2</td><td>Fire Mode Test</td><td>The drive simulates fire mode operation for a while. Then, it stops.</td></tr></table>	OPT.	DESCR.	FUNCTION	0	None	Fire mode is off	1	Fire Mode	Fire mode enabled. When the digital input configured as 'Fire Mode', the drive will start working in this mode, at the frequency configured in Ad.81 and the direction set in Ad.82.	2	Fire Mode Test	The drive simulates fire mode operation for a while. Then, it stops.	NO
OPT.	DESCR.	FUNCTION															
0	None	Fire mode is off															
1	Fire Mode	Fire mode enabled. When the digital input configured as 'Fire Mode', the drive will start working in this mode, at the frequency configured in Ad.81 and the direction set in Ad.82.															
2	Fire Mode Test	The drive simulates fire mode operation for a while. Then, it stops.															
Ad.81 [17]	Fire mode frequency	60.00Hz	0.00 to 60.00Hz	Set the frequency for drive operation in Fire mode. The Fire mode frequency takes priority over the Jog frequency, Multi-step frequencies, and frequency configured from keyboard.	NO												
Ad.82 [17]	Fire mode direction	Forward	Forward Reverse	<p>Set Fire mode direction:</p> <table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>Forward</td><td>Forward direction.</td></tr><tr><td>1</td><td>Reverse</td><td>Reverse direction.</td></tr></table>	OPT.	DESCR.	FUNCTION	0	Forward	Forward direction.	1	Reverse	Reverse direction.	NO			
OPT.	DESCR.	FUNCTION															
0	Forward	Forward direction.															
1	Reverse	Reverse direction.															

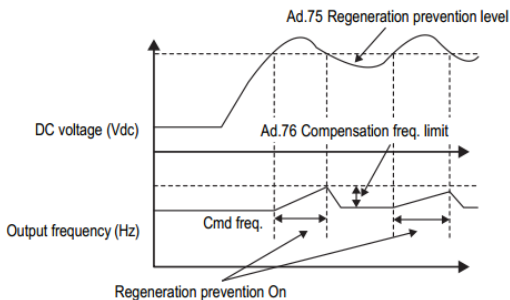
[17] Displayed when Ad.80 is set to 1 (YES).



Acceleration dwell frequency



Safe operation stop



Regeneration prevention level

Group 4: Control Functions → Cn

Screen	Description	Default value	Range	Function	Set on RUN									
Cn.4	Modulation frequency	3.0kHz	-	<p>Adjust motor operational noise by varying the commutation frequency in the motor output stage</p> <p>If the frequency is set high, it reduces operational noise from the motor, and if it is set low, the operational noise from the motor increases.</p> <p>Default value and range for this parameter depend on the load rate:</p> <p>Normal load: 2kHz (Max 5kHz). Heavy load: 3kHz (Max 15kHz).</p>	NO									
Cn.5	Modulation mode	Normal PWM	0 to 1	<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>Normal PWM</td><td>No changes to load rate.</td></tr><tr><td>1</td><td>Low Leakage PWM</td><td>Reduces heat loss and leakage current compared to Normal PWM, but the motor noise increases.</td></tr></table>	OPT.	DESCR.	FUNCTION	0	Normal PWM	No changes to load rate.	1	Low Leakage PWM	Reduces heat loss and leakage current compared to Normal PWM, but the motor noise increases.	NO
OPT.	DESCR.	FUNCTION												
0	Normal PWM	No changes to load rate.												
1	Low Leakage PWM	Reduces heat loss and leakage current compared to Normal PWM, but the motor noise increases.												
Cn.9	Pre-excitation time	1.00s	0.00 to 60.00s	Set the initial excitation time. Pre-excitation is used to start the operation after performing excitation up to the motor's rated flux.	NO									

Screen	Description	Default value	Range	Function	Set on RUN
Cn.10	Pre-excitation flux	100.0%	100.0 to 500.0%	Adjust the flux supplied during the pre-excitation time set in Cn.9. The motor flux increases up to the rated flux with the time constant as shown in Figure Pre-excitation flux . To reduce the time taken to reach the rated flux, a higher motor flux base value than the rated flux must be provided. When the magnetic flux reaches the rated flux, the provided motor flux base value is reduced.	NO
Cn.11	Power off delay	0.00s	0.00 to 60.00s	After the motor stops, this parameter sets the time during which direct current from the drive is fed into the motor This function is illustrated in Figure Power off delay .	NO
Cn.12	PM speed controller P gain 1	100	0–5000	Adjust the proportional gain 1 of the speed controller (low speed) for the permanent magnet synchronous motor control. If the speed deviation is greater than the torque, the output command will increase accordingly. With a high P value, the speed is regulated faster. A very high value can cause instability in speed. Note: Visible parameter if dr.9 = PM Sensor-less	NO
Cn.13	PM speed controller I gain 1	100	0–5000	Adjust the integral gain 1 of the speed controller (low speed) for the permanent magnet synchronous motor control. If the speed deviation is greater than the torque, the output command will increase accordingly. With a high P value, the speed is regulated faster. A very high value can cause instability in speed. Note: Visible parameter if dr.9 = PM Sensor-less	NO

Screen	Description	Default value	Range	Function	Set on RUN									
Cn.15	PM speed controller P gain 2	100	0–5000	Adjust the proportional gain 2 of the speed controller (high speed) for permanent magnet synchronous motor control. Note: Visible parameter if dr.9 = PM Sensor-less	NO									
Cn.16	PM speed controller I gain 2	150	0–9999	Adjust the integral gain 2 of the speed controller (high speed) for permanent magnet synchronous motor control. Note: Visible parameter if dr.9 = PM Sensor-less	NO									
Cn.20	Sensorless control gain 2	NO	NO YES	Allows configuring the sensorless control gain. <table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>NO</td><td>Sensorless control gain configuration parameters will not be shown.</td></tr><tr><td>1</td><td>YES</td><td>Enables sensorless control gain configuration. Parameters Cn.21-32 will be displayed.</td></tr></table>	OPT.	DESCR.	FUNCTION	0	NO	Sensorless control gain configuration parameters will not be shown.	1	YES	Enables sensorless control gain configuration. Parameters Cn.21-32 will be displayed.	YES
OPT.	DESCR.	FUNCTION												
0	NO	Sensorless control gain configuration parameters will not be shown.												
1	YES	Enables sensorless control gain configuration. Parameters Cn.21-32 will be displayed.												
Cn.21	ASR proportional gain 1	(*)	0 to 5000%	Set the proportional gain 1 of the speed controller (ASR). The higher the proportional gain, the faster the response will be. But if the gain is too high, the speed of the motor might oscillate.	YES									
Cn.22	ASR integral time 1	(*)	10 to 9999ms	Set the integral gain 1 of the speed controller (ASR).	YES									
Cn.23 [18]	Independent controller proportional gain 2	(*)	1.0 to 1000.0%	Set the proportional gain 2 of a separate controller. The higher the proportional gain, the faster the response will be. But if the gain is too high, the speed of the motor might oscillate.	YES									

[18] Displayed when dr.9 is set to 4 (S-less1) and Cn.20 is set to 1 (YES).

(*) This value depends on the motor setting.

Screen	Description	Default value	Range	Function	Set on RUN
Cn.24 [18]	Independent controller integral gain 2	(*)	1.0 to 1000.0%	Set the integral gain 2 of a separate controller.	YES
Cn.25 [18]	Integral time sensorless controller	(*)	10 to 999ms	Sensorless speed controller integral gain 0.	YES
Cn.26 [18]	Flux estimator proportional gain	(*)	1 to 200%	Sensorless vector control requires the rotor flux estimator. Use these parameters to adjust flux estimator gain	YES
Cn.27 [18]	Flux estimator integral gain	(*)	1 to 200%		YES
Cn.28 [18]	Speed estimator proportional gain 1	(*)	0 to 32767	Adjusts speed estimator gain for sensorless vector control: <ul style="list-style-type: none"> At low speed (10Hz or lower), increase the value of Cn.29 by increments of 5. At mid speed (30 Hz or higher), increase the value of Cn.28 by increments of 500. 	YES
Cn.29 [18]	Speed estimator integral gain 1	(*)	100 to 1000	If the parameter setting is too extreme, over current trip may occur at low speed.	YES
Cn.30 [18]	Speed estimator integral gain 2	(*)	100 to 10000		YES
Cn.31 [18]	Sensorless cont. proportional gain	(*)	10 to 1000	Adjusts the P and I gains of the sensorless current controller.	YES
Cn.32 [18]	Sensorless cont. integral gain	(*)	10 to 1000	If the value of Cn.10 is high, an overcurrent trip at start can occur. In this case, reduce the value of Cn.31 by decrements of 10.	YES

[18] Displayed when dr.9 is set to 4 (S-less1) and Cn.20 is set to 1 (YES).

(*) Estos valores dependen del ajuste del motor.

Cn.33	PM D-axis back-EMF estimated gain (%)	100.0%	0–300.0%	<p>Adjusts the gain of the velocity speed estimator on the D axis of the back EMF for the permanent magnet motor control. Set these values as a percentage of the proportional gain to have a stable polarity estimator. Higher values result in faster responses, with greater possibilities of motor vibration. Excessively low values can cause motor starting failure due to a slow response rate.</p> <p>For short acceleration ramps, a low value in Cn.33 is recommended (less than 100%), but the initial torque could decrease. With fast ramps, it is recommended to increase the value of Cn.33</p> <p>Note: Visible parameter if dr.9 = PM Sensor-less</p>	NO
Cn.34	PM Q-axis back-EMF estimated gain (%)	100.0%	0–300.0%	<p>Adjusts the gain of the speed estimator on the Q axis of the back EMF for the permanent magnet motor control. Set these values as a percentage of the proportional gain to have a stable polarity estimator. Higher values result in faster responses, with greater possibilities of motor vibration.</p> <p>Note: Visible parameter if dr.9 = PM Sensor-less</p>	NO
Cn.35	Nº de reintentos estimación posición inicial del polo	2	0–10	<p>Allows adjusting the number of retries to estimate the initial position of the pole. The initial detection of the pole position is a process that coincides with the position of the rotor calculated by the drive and the actual position of the rotor in a motor. In a permanent magnet synchronous motor (PM), the rotor flux is generated by the permanent magnet attached to the rotor. Therefore, to operate the motor in vector control mode, the exact position of the rotor (flow position) must be detected for a precise control of the torque generated by the motor.</p> <p>Note: Visible parameter if dr.9 = PM Sensor-less</p>	NO

Cn.36	Initial pole position estimation interval	20ms	1–100ms	It allows adjusting the time interval between retries to estimate the initial position of the pole in a permanent magnet synchronous motor (PM). Note: Visible parameter if dr.9 = PM Sensor-less	NO
Cn.37	Initial pole position estimation pulse current (%)	15%	10–100%	It allows adjusting the value of the current pulse in the estimation of the initial position of the pole in a permanent magnet synchronous motor (PM). Note: Visible parameter if dr.9 = PM Sensor-less	NO
Cn.38	Initial pole position estimation pulse voltage (%)	500%	100–4000	It allows adjusting the value of the voltage pulse in the estimation of the initial position of the pole in a permanent magnet synchronous motor (PM). Note: Visible parameter if dr.9 = PM Sensor-less	NO
Cn.39	PM dead-time range (%)	100.0%	50.0–200.0%	Sets the output compensation values during the operation of a permanent magnet synchronous motor in sensorless vector control mode. If the motor does not run at low speeds, at 5%, or less, of the rated motor speed, increase the values in 10% increments. Decrease the values by 10% decrements if a clanking noise occurs at motor startup and motor stop. Note: Visible parameter if dr.9 = PM Sensor-less	NO
Cn.40	PM dead-time voltage (%)	100.0%	50.0–200.0%		
Cn.41	PM speed estimator proportional gain	100	0–32000	Establish the values of the gain of the speed estimator during the operation of a permanent magnet synchronous motor in sensorless vector control mode. If there is a fault or the motor vibrates at low speed, decrease this parameter by 10% decrements until the motor runs correctly. Note: Visible parameter if dr.9 = PM Sensor-less	NO

Cn.42	PM speed estimator integral gain	10	0–32000	Establishes the values of the gain of the speed estimator during the operation of a permanent magnet synchronous motor in sensorless vector control mode. If oscillations occur during normal motor operation, increase this parameter. Note: Visible parameter if dr.9 = PM Sensor-less	NO
Cn.43	PM speed estimator proportional gain	300	0–32000	Establishes the values of the gain of the speed estimator during the operation of a permanent magnet synchronous motor in sensorless vector control mode. They are used for low speed operations for 200V motors. Note: Visible parameter if dr.9 = PM Sensor-less	NO
Cn.44	PM speed estimator integral gain 2	30	0–32000	Establishes the values of the gain of the speed estimator during the operation of a permanent magnet synchronous motor in sensorless vector control mode. They are used for low speed operations for 200V motors. Note: Visible parameter if dr.9 = PM Sensor-less	NO
Cn.45	Speed estimator feedforward high speed range (%)	300%	0–1000%	Establishes the high speed portion of the feedback speed with respect to the EMF during the operation of a permanent magnet synchronous motor in the sensorless vector control mode. The forwarding of feeds improves the operation of the speed estimator. Increase the value of this parameter in increments of 10% to eliminate oscillations in the motor. If it is set too high a fault can occur. Note: Visible parameter if dr.9 = PM Sensor-less	NO

Cn.46	Initial pole position estimation type	1: Det. de ángulo	0–2	<p>It allows selecting the type of initial estimation of the pole position:</p> <ul style="list-style-type: none"> - 0: None. The motor operates according to the estimation of the position of the pole obtained by the algorithm of the drive. - 1: Angle detection. The motor operates according to the position of the pole obtained by changes in current. The voltage pulse input is used to detect the polar position and it produces a small amount of noise at motor startup. - 2: Alignment. The rotor aligns the position of the rotor supplying DC current for a certain period of time. <p>Note: Visible parameter if dr.9 = PM Sensor-less</p>	NO
Cn.48	Controller P gain	1200	10 to 10000	<p>Adjust current controller P gain.</p> <p>Note: Visible parameter if dr.9 = PM Sensor-less</p>	YES
Cn.49	Controller I gain	120	10 to 10000	<p>Adjust current controller I gain</p> <p>Note: Visible parameter if dr.9 = PM Sensor-less</p>	YES
Cn.50	Lim. controlador de tensión	10.0%	0–1000%	<p>Allows increasing the output voltage in certain situations. Do not modify this parameter if it is not necessary, if the motor supplies the desired torque at the maximum speed, do not modify it. Increasing this parameter can cause a higher level of THDi in the motor.</p> <p>Note: Visible parameter if dr.9 = PM Sensor-less</p>	NO
Cn.51	Gan. integral controlador de tensión	10.0%	0–20000%		
Cn.52	Output filter vector	0ms	0 to 2000ms	Set the torque controller output filter	NO

Screen	Description	Default value	Range	Function	Set on RUN																											
Cn.53	Torque limit reference	LOCAL	0 to 12	Select the source to introduce the torque limit reference.	NO																											
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>LOCAL</td><td>Reference will be given by keypad and will be set in (dr.2) – Local Torque.</td></tr><tr><td>2</td><td>V1</td><td>Reference will be introduced through the voltage analog input 1.</td></tr><tr><td>4</td><td>V2</td><td>Reference will be introduced through the voltage analog input 2.</td></tr><tr><td>5</td><td>I2</td><td>Reference will be introduced through the current analog input 2.</td></tr><tr><td>6</td><td>MODBUS</td><td>The reference will be introduced through Modbus.</td></tr><tr><td>8</td><td>COMMS</td><td>The reference will be introduced through the communications.</td></tr><tr><td>9</td><td>PLC</td><td>The common area can be linked with user sequence output and can be used as command.</td></tr><tr><td>12</td><td>PULSE</td><td>Reference will be introduced through the Pulse input.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	LOCAL	Reference will be given by keypad and will be set in (dr.2) – Local Torque.	2	V1	Reference will be introduced through the voltage analog input 1.	4	V2	Reference will be introduced through the voltage analog input 2.	5	I2	Reference will be introduced through the current analog input 2.	6	MODBUS	The reference will be introduced through Modbus.	8	COMMS	The reference will be introduced through the communications.	9	PLC	The common area can be linked with user sequence output and can be used as command.	12	PULSE	Reference will be introduced through the Pulse input.
				OPT.		DESCR.	FUNCTION																									
				0		LOCAL	Reference will be given by keypad and will be set in (dr.2) – Local Torque.																									
				2		V1	Reference will be introduced through the voltage analog input 1.																									
				4		V2	Reference will be introduced through the voltage analog input 2.																									
				5		I2	Reference will be introduced through the current analog input 2.																									
				6		MODBUS	The reference will be introduced through Modbus.																									
				8		COMMS	The reference will be introduced through the communications.																									
				9		PLC	The common area can be linked with user sequence output and can be used as command.																									
12	PULSE	Reference will be introduced through the Pulse input.																														
Cn.54 [19]	Forward positive torque limit	180.0%	0.0 to 200.0%	The user can set the forward motoring operation torque limit whenever the torque limit reference has been set as LOCAL.	YES																											

[19] Displayed when dr.9 is set to 4 (Sless-1). This will change the initial value of Ad.74, Torque limit, to 150%.

Screen	Description	Default value	Range	Function	Set on RUN																								
Cn.55 [19]	Forward negative torque limit	180.0%	0.0 to 200.0%	The user can set the forward regeneration operation torque limit whenever the torque limit reference has been set as LOCAL	YES																								
Cn.56 [19]	Reverse positive torque limit	180.0%	0.0 to 200.0%	The user can set the reverse motoring operation torque limit whenever the torque limit reference has been set as LOCAL	YES																								
Cn.57 [19]	Reverse negative torque limit	180.0%	0.0 to 200.0%	The user can set the reverse regeneration operation torque limit whenever the torque limit reference has been set as LOCAL	YES																								
Cn.62 [19]	Speed limit reference	LOCAL	0 to 8	Select the source to introduce the speed limit reference.	NO																								
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>LOCAL</td><td>Reference will be given by keypad and will be set in dr.1.</td></tr><tr><td>2</td><td>V1</td><td>Reference will be introduced through the voltage analog input 1.</td></tr><tr><td>4</td><td>V2</td><td>Reference will be introduced through the voltage analog input 2.</td></tr><tr><td>5</td><td>I2</td><td>Reference will be introduced through the current analog input 2.</td></tr><tr><td>6</td><td>MOD BUS</td><td>The reference will be introduced through Modbus.</td></tr><tr><td>7</td><td>COMM S</td><td>The reference will be introduced through the communications.</td></tr><tr><td>8</td><td>PLC</td><td>The common area can be linked with user sequence output and can be used as command.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	LOCAL	Reference will be given by keypad and will be set in dr.1.	2	V1	Reference will be introduced through the voltage analog input 1.	4	V2	Reference will be introduced through the voltage analog input 2.	5	I2	Reference will be introduced through the current analog input 2.	6	MOD BUS	The reference will be introduced through Modbus.	7	COMM S	The reference will be introduced through the communications.	8	PLC	The common area can be linked with user sequence output and can be used as command.
				OPT.		DESCR.	FUNCTION																						
				0		LOCAL	Reference will be given by keypad and will be set in dr.1.																						
				2		V1	Reference will be introduced through the voltage analog input 1.																						
				4		V2	Reference will be introduced through the voltage analog input 2.																						
				5		I2	Reference will be introduced through the current analog input 2.																						
				6		MOD BUS	The reference will be introduced through Modbus.																						
				7		COMM S	The reference will be introduced through the communications.																						
				8		PLC	The common area can be linked with user sequence output and can be used as command.																						
Cn.63 [19]	Forward speed limit	60.00Hz	0.00 to 400.00Hz	The user can set the forward speed limit whenever the speed limit reference has been set as LOCAL.	YES																								
Cn.64 [19]	Reverse speed limit	60.00Hz	0.00 to 400.00Hz	The user can set the reverse speed limit whenever the speed limit reference has been set as LOCAL.	YES																								

Screen	Description	Default value	Range	Function	Set on RUN							
Cn.65 [19]	Speed limit gain	500%	100 to 5000%	Set how much the speed reference has to decrease when motor speed exceeds the speed limit.	YES							
Cn.70	Speed search mode selection	Flying Start1	Flying Start1 Flying Start2	Select a speed search mode.	NO							
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>Flying Start1</td><td>Speed search is carried out as it controls the drive output current during idling below Cn.72. If the direction of the idling motor and the direction of operation command at restart are the same, a stable speed search function can be performed at about 10 Hz or lower. However, if the direction of the idling motor and of operation command at restart are different, the speed search does not produce a satisfactory result because the direction of idling cannot be established.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	Flying Start1	Speed search is carried out as it controls the drive output current during idling below Cn.72. If the direction of the idling motor and the direction of operation command at restart are the same, a stable speed search function can be performed at about 10 Hz or lower. However, if the direction of the idling motor and of operation command at restart are different, the speed search does not produce a satisfactory result because the direction of idling cannot be established.	
				OPT.		DESCR.	FUNCTION					
0	Flying Start1	Speed search is carried out as it controls the drive output current during idling below Cn.72. If the direction of the idling motor and the direction of operation command at restart are the same, a stable speed search function can be performed at about 10 Hz or lower. However, if the direction of the idling motor and of operation command at restart are different, the speed search does not produce a satisfactory result because the direction of idling cannot be established.										
Note: Continues on the next page.												

[19] Displayed when dr.9 is set to 4 (Sless-1). This will change the initial value of Ad.74, Torque limit, to 150%.

Screen	Description	Default value	Range	Function	Set on RUN										
Cn.70	Speed search mode selection	Flying Start1	Flying Start1 Flying Start2	Note: comes from the previous page	NO										
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>1</td><td>Flying Start2</td><td>The speed search is carried out as it controls the ripple current which is generated by the counter electromotive force during no-load rotation. This mode establishes the direction of the idling motor (forward/reverse), thus the speed search function is stable regardless the direction of the idling motor and of operation command. However, since ripple current is used, the idle frequency is not accurately determined and re-acceleration may start from zero speed when the speed search is performed for the idling motor at low speed (about 10 - 15 Hz, though it depends on motor characteristics).</td></tr></table>		OPT.	DESCR.	FUNCTION	1	Flying Start2	The speed search is carried out as it controls the ripple current which is generated by the counter electromotive force during no-load rotation. This mode establishes the direction of the idling motor (forward/reverse), thus the speed search function is stable regardless the direction of the idling motor and of operation command. However, since ripple current is used, the idle frequency is not accurately determined and re-acceleration may start from zero speed when the speed search is performed for the idling motor at low speed (about 10 - 15 Hz, though it depends on motor characteristics).				
				OPT.		DESCR.	FUNCTION								
1	Flying Start2	The speed search is carried out as it controls the ripple current which is generated by the counter electromotive force during no-load rotation. This mode establishes the direction of the idling motor (forward/reverse), thus the speed search function is stable regardless the direction of the idling motor and of operation command. However, since ripple current is used, the idle frequency is not accurately determined and re-acceleration may start from zero speed when the speed search is performed for the idling motor at low speed (about 10 - 15 Hz, though it depends on motor characteristics).													
Cn.71	Search mode	0000	00 to 15	Set the search mode. Adjust each bit to 0 or 1 according to the table below:	NO										
				<table><tr><th>OPT.</th><th>FUNCTION.</th></tr><tr><td>0001</td><td>Selection of speed search on acceleration.</td></tr><tr><td>0010</td><td>Speed search on start after fault.</td></tr><tr><td>0100</td><td>Speed search after a power supply fault.</td></tr><tr><td>1000</td><td>Speed search when the drive is energized, if the start command is present.</td></tr></table>		OPT.	FUNCTION.	0001	Selection of speed search on acceleration.	0010	Speed search on start after fault.	0100	Speed search after a power supply fault.	1000	Speed search when the drive is energized, if the start command is present.
				OPT.		FUNCTION.									
				0001		Selection of speed search on acceleration.									
				0010		Speed search on start after fault.									
0100	Speed search after a power supply fault.														
1000	Speed search when the drive is energized, if the start command is present.														

Screen	Description	Default value	Range	Function	Set on RUN
Cn.72 [20]	Speed search mode current	150%	80 to 200%	Allows controlling the current during the speed search in percentage in relation with the motor rated current.	YES
Cn.73 [21]	Speed search mode prop. gain	Depends on the value of Cn.70	0 to 9999	Allows setting the proportional gain for the speed search. Note: The default value of this parameter depends on Cn.70: Flying Start1→100 Flying Start2→600	YES
Cn.74 [21]	Speed search mode integral gain		0 to 9999	Allows setting the proportional gain for the speed search. Note: The default value of this parameter depends on Cn.70: Flying Start1→200 Flying Start2→1000	YES
Cn.75 [21]	Speed search delay	1.0s	0.0 to 60.0s	Allows locking the output during an established time before proceeding with the speed search.	NO
Cn.76 [21]	Speed estimator gain	100%	50 to 150%	Speed search estimator gain.	YES
Cn.77	KEB Select	No	0 to 2	When the input power supply is disconnected, the drive DC link voltage decreases and a low voltage trip occurs blocking the output. A kinetic energy buffering operation uses regenerative energy generated by the motor during the blackout to maintain the DC link voltage. This extends the time for a low voltage trip to occur after a sudden power interruption. This parameter allows selecting the kinetic energy buffering operation. If 1 or 2 is selected, it controls the drive output frequency and charges the DC link (drive DC part) with energy generated from the motor. Note: Continues on the next page.	NO

[20] Displayed when any of the bits in Cn.71 bits are set to 1 and Cn.70 is set to 0.

[21] Displayed when any of the bits in Cn.71 bits are set to 1.

Screen	Description	Default value	Range	Function	Set on RUN		
				Note: Comes from the previous page.			
				OPT.	DESCR.		FUNCTION
				0	No		General deceleration is carried out until a low voltage trip occurs.
				1	KEB1		When the input power is lost, it charges the DC link with regenerated energy. When the input power is restored, so does normal operation from energy buffering operation to the frequency reference operation. Operation frequency acceleration is set in Cn.83.
				2	KEB2		When the input power is lost, it charges the DC link with regenerated energy. When the input power is restored, it changes from the energy buffering operation to the deceleration stop operation. The operation frequency deceleration time is set in dr.4.
Cn.78 [22]	Initial value for KEB operation	125.0%	110.0 to 200.0%	Sets the start and stop points of the kinetic energy buffering operation. The set values must be based on the low voltage trip level as 100% and the stop level (Cn.79) must be higher than the start level (Cn.78).	NO		
Cn.79 [22]	Value to stop KEB operation	130.0%	Cn.78 to 210.0%		NO		

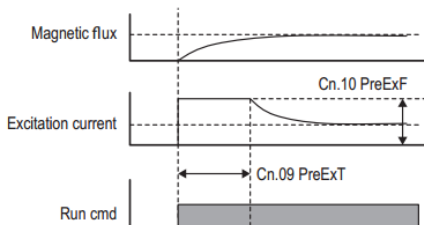
[22] Displayed when Cn.77 is not set to 0 (NO).

Screen	Description	Default value	Range	Function	Set on RUN
Cn.80 [22]	KEB proportional gain	10000	1 to 20000	Maintain the voltage of the DC power section during the kinetic energy buffering operation. Change the setting value when a low voltage trip occurs right after a power failure.	YES
Cn.81 [22]	KEB integral gain	500 [22]	1 to 20000	Maintain the voltage of the DC power section during the kinetic energy buffering operation. Sets the gain value to maintain the frequency during the kinetic energy buffering operation until the drive stops.	YES
Cn.82 [22]	Energy buffering Slip gain	30.0	0 to 2000.0%	Regulation of KEB function. Slip gain KEB.	YES
Cn.83 [22]	Energy buffering acceleration time	10.0	0.0 to 600.0 s	Regulation of KEB function. Acceleration time KEB.	YES
Cn.85 [23]	Flux proportional gain 1	370	100 to 700	Flux estimator proportional gain 1.	YES
Cn.86 [23]	Flux proportional gain 2	0	0 to 100	Flux estimator proportional gain 2.	YES
Cn.87 [23]	Flux proportional gain 3	100	0 to 500	Flux estimator proportional gain 3.	YES
Cn.88 [23]	Flux integral gain 1	50 [23]	0 to 200	Flux estimator integral gain 1.	YES
Cn.89 [23]	Flux integral gain 2	50 [24]	0 to 200	Flux estimator integral gain 2.	YES
Cn.90 [23]	Flux integral gain 3	50 [24]	0 to 200	Flux estimator integral gain 3.	YES

[22] Displayed when Cn.77 is not set to 0 (NO).

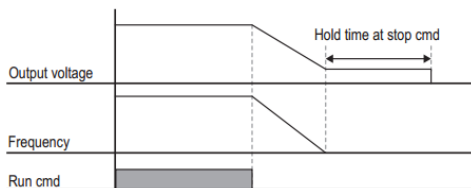
[23] Displayed when Cn.20 is set to 1 (YES).

Screen	Description	Default value	Range	Function	Set on RUN
Cn.91 [23]	SL voltage compensation 1	20 (*)	0 to 60	Adjust output voltage compensation values for sensorless vector control. <ul style="list-style-type: none"> If the output frequency is higher than the base frequency during no-load operation at low speed, decrease the value of Cn.91 by decrements of 5 (10Hz or lower). If the torque is insufficient, increase Cn.93 by increments of 5. 	YES
Cn.92 [23]	SL voltage compensation 2	20 (*)	0 to 60		YES
Cn.93 [23]	SL voltage compensation 3	20 (*)	0 to 60		YES
Cn.94 [23]	SL fluctuation frequency	100.0% [24]	80.0 to 110.0%	If an over current trip occurs due to sudden load fluctuation at high speed (50 Hz or higher), increase/decrease the value of Cn.94 by increments/decrements of 5% (set below 100%).	YES
Cn.95 [23]	SL switching frequency	2.00Hz [24]	0.00 to 8.00Hz	Set sensorless gain switching frequency.	YES



Pre-excitation flux

(*) This value depends on the motor setting.

*Power off delay*

Group 5: Inputs → In

Screen	Description	Default value	Range	Function	Set on RUN						
In.1	Analog input max. freq	dr.20	dr.19 to dr.20	Set drive operating frequency for the maximum voltage input of the analog input.	YES						
In.2	Analog input max. torque	100.0%	0.0 to 200.0%	Reserved.	YES						
In.5	V1 Monitor	0.00V	0.00 to 12.00	Voltage analog input 1 (V1) visualization.	NO						
In.6	V1 polarity	0-10V	0-10V -/+10V	<div>This parameter allows setting the operation directions of the drive:</div> <table><tr><th>DESCR</th><th>FUNCTION</th></tr><tr><td>0-10V</td><td>Unipolar (forward operation)</td></tr><tr><td>±10V</td><td>Bipolar (forward and reverse operation directions)</td></tr></table>	DESCR	FUNCTION	0-10V	Unipolar (forward operation)	±10V	Bipolar (forward and reverse operation directions)	NO
DESCR	FUNCTION										
0-10V	Unipolar (forward operation)										
±10V	Bipolar (forward and reverse operation directions)										
In.7	V1 filter	10ms	0 to 10000ms	Low Pass Filter for V1. Allows setting the time response to a change produced in the speed reference, to reduce the speed fluctuation due to unstable signs or noise. Thus, the response becomes slower.	YES						
In.8	V1 minimum voltage	0.00V	0.00 to 10.00V	Define the minimum voltage for the analog input 1 according to the connected sensor characteristics	YES						
In.9	V1 minimum reference	0.00%	0.00 to 100.00%	Set the speed reference corresponding to the analog input 1 minimum negative range. It corresponds to the minimum voltage level set in In.12. It is configured to introduce the speed reference through the AI. The value is a percentage of the frequency set in In.1.	YES						
In.10	V1 maximum voltage	10.00V	0.00 to 10.00V	Define the maximum voltage for the analog input 1, according to the connected sensor characteristics.	YES						

Screen	Description	Default value	Range	Function	Set on RUN
In.11	V1 maximum reference	10.00%	0.00 to 100.00%	Set the speed reference corresponding to the analog input 1 minimum range. It corresponds to the minimum voltage level set in In.10. It is configured to introduce the speed reference through the V1 analog input. The value is a percentage of In.1.	YES
In.12 [24]	V1 minimum negative voltage	10.00V	-10.00 to 0.00V	Define the negative minimum voltage for the analog input 1, according to the connected sensor characteristics.	YES
In.13 [24]	V1 minimum negative reference	-10.00%	-100.00 to 0.00%	Set the speed reference corresponding to the analog input 1 minimum negative range. It corresponds to the minimum voltage level set in In.12. It is configured to introduce the speed reference through the analog input. The value is a percentage of the frequency adjusted in parameter In.1.	YES
In.14 [24]	V1 maximum negative voltage	-10.00V	-10.00 to 0.00V	Define the maximum negative voltage for the analog input 1 according to the connected sensor characteristics.	YES
In.15 [24]	V1 maximum negative reference	10.00%	-100.00 to 0.00%	Set the speed reference corresponding to the analog input 1 maximum negative range. It corresponds to the maximum voltage level set in In.13. It is configured to introduce the speed reference through an analog input. The value is a percentage of In.1.	YES
In.16	V1 Inverting	N	N S	Inverts the direction of rotation. Set this parameter to 1 (NO) if you need the motor to run in the opposite direction from the current rotation.	YES

[24] Displayed if In.6 is configured as bipolar ($\pm 10V$).

Screen	Description	Default value	Range	Function	Set on RUN
In.17	Adjust V1 quantification	0.04%	0.04 to 10.00%	Set the voltage analog input 1 quantification level. It is used when too much noise is present within the analog input signals. The quantification value is defined as the analog input 1 maximum percentage value. For example, if the input maximum value is 10V and the quantification level is 1%, the frequency will change in 0.05Hz (when the maximum frequency is 50Hz), in 0.1V intervals. As the input voltage increases or decreases, the output frequency will differ, removing the fluctuation effect within the analog input value.	YES
In.35 [25]	V2 Monitor	0.00V	0.00 to 12.00V	Voltage analog input 2 monitor.	YES
In.37 [25]	V2 filter	10ms	0 to 10000ms	Set the time response against a change produced in the speed reference, so that it can reduce the speed fluctuation due to unstable signs or noise. Thus, the response becomes slower.	NO
In.38 [25]	V2 minimum voltage	0.00V	0.00 to 10.00V	Define the minimum current for the analog input 2 according to the characteristics of the connected sensor.	YES
In.39 [25]	V2 minimum reference	0.00%	0.00 to 100.00%	Set the speed reference corresponding to the analog input 2 minimum range. It corresponds to the minimum voltage level set in In.38. It is configured to introduce the speed reference through the analog input. The value is a percentage of the frequency adjusted in parameter In.1.	YES
In.40 [25]	V2 maximum current	10.00V	0.00 to 10.00V	Define the maximum current for the analog input 2, according to the connected sensor characteristics.	YES

[25] Displayed when V is selected on the analog current/voltage input circuit selection switch (SW2).

Screen	Description	Default value	Range	Function	Set on RUN
In.41 [25]	V2 maximum reference	100.00%	0.00 to 100.00%	Set the speed reference corresponding to the analog input 2 maximum range. It corresponds to the maximum current level set in In.40. It is configured to introduce the speed reference through the analog input. The value is a percentage of the frequency adjusted in parameter In.1.	YES
In.46 [25]	V2 Inverting	N	NO YES	Same as In.16, but for the voltage analog input 2.	YES
In.47 [25]	Adjust I2 visualization	0.04	0.04 to 10.00%	Same as In.17, but for the voltage analog input 2.	YES
In.50 [26]	I2 Monitor	0.00mA	0.00 to 24.00mA	Used to monitor current analog input 2.	NO
In.52 [26]	I2 filter	10ms	0 to 10000ms	Configures the time for the operation frequency to reach 63% of target	YES
In.53 [26]	I2 minimum current	4.00mA	0.00 to 20.00mA	Same as In.38, but for the current analog input 2.	YES
In.54 [26]	I2 minimum reference	0.00%	0.00 to 100.00%	Same as In.13, but for the current analog input 2.	YES
In.55 [26]	I2 maximum current	20.00mA	0.00 to 24.00mA	Same as In.40, but for the current analog input 2.	YES
In.56 [26]	I2 maximum reference	100.00%	0.00 to 100.00	Same as In.11, but for the current analog input 2.	YES
In.61 [26]	I2 Inverting	N	N Y	Same as In.16, but for the current analog input 2.	YES
In.62 [26]	Adjust I2 visualization	0.04%	0.04 to 10.00%	Same as In.17, but for the current analog input 2.	NO

[25] Displayed when V is selected on the analog current/voltage input circuit selection switch (SW2).

[26] Displayed when I is selected on the analog current/voltage input circuit selection switch (SW2).

Screen	Description	Default value	Range	Function	Set on RUN																								
In.65	Digital input 1	START (+)	0 to 54	Digital Inputs configuration for individual use.	NO																								
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>None</td><td>Not programmed entry.</td></tr><tr><td>1</td><td>START(+)</td><td>Send the start command through an open contactor (NO). The operation of the Digital Input varies when '3 WIRE' is selected.</td></tr><tr><td>2</td><td>START(-)</td><td>Send the reverse start command through an open contactor (NO). The operation of the Digital Input varies when '3 WIRE' is selected.</td></tr><tr><td>3</td><td>RESET</td><td>Send a 'Reset' command through digital inputs. (NO)</td></tr><tr><td>4</td><td>EXTTRIP</td><td>Trigger an external fault to stop the drive through digital inputs (NO). Is advisable to invert the digital input logic configured as Extreme Fault and set it as contact (NC). See parameter In.87.</td></tr><tr><td>5</td><td>DISSTART</td><td>Stop the drive by removing the motor output power supply, forcing a stop by inertia. (NO)</td></tr><tr><td>6</td><td>INCH1</td><td>Enable the speed reference programmed in dr.11. (NO)</td></tr></table>		OPT.	DESCR.	FUNCTION	0	None	Not programmed entry.	1	START(+)	Send the start command through an open contactor (NO). The operation of the Digital Input varies when '3 WIRE' is selected.	2	START(-)	Send the reverse start command through an open contactor (NO). The operation of the Digital Input varies when '3 WIRE' is selected.	3	RESET	Send a 'Reset' command through digital inputs. (NO)	4	EXTTRIP	Trigger an external fault to stop the drive through digital inputs (NO). Is advisable to invert the digital input logic configured as Extreme Fault and set it as contact (NC). See parameter In.87.	5	DISSTART	Stop the drive by removing the motor output power supply, forcing a stop by inertia. (NO)	6	INCH1	Enable the speed reference programmed in dr.11. (NO)
				OPT.		DESCR.	FUNCTION																						
				0		None	Not programmed entry.																						
				1		START(+)	Send the start command through an open contactor (NO). The operation of the Digital Input varies when '3 WIRE' is selected.																						
				2		START(-)	Send the reverse start command through an open contactor (NO). The operation of the Digital Input varies when '3 WIRE' is selected.																						
				3		RESET	Send a 'Reset' command through digital inputs. (NO)																						
				4		EXTTRIP	Trigger an external fault to stop the drive through digital inputs (NO). Is advisable to invert the digital input logic configured as Extreme Fault and set it as contact (NC). See parameter In.87.																						
				5		DISSTART	Stop the drive by removing the motor output power supply, forcing a stop by inertia. (NO)																						
6	INCH1	Enable the speed reference programmed in dr.11. (NO)																											
Note: Continues on the next page																													

Screen	Description	Default value	Range	Function	Set on RUN		
In.66	Digital input 2	START (-)	0 to 54	Note: Comes from the previous page.	NO		
				OPT.		DESCR.	FUNCTION
				7		SPEED-L	Bit 0 speed reference. Allows selecting the multiple preconfigured speed references. See St1-St3 and bA.53 -bA.56 (NO).
				8		SPEED-M	Bit 1 speed reference. Allows selecting the multiple preconfigured speed references. See St1-St3 and bA.53 -bA.56 (NO).
				9		SPEED-H	Bit 2 speed reference. Allows selecting the multiple preconfigured speed references. See St1-St3 and bA.53 -bA.56 (NO).
				11		XCEL-L	Bit 0 for alternative acceleration ramps. Allows the selection of the multiple preconfigured acceleration/deceleration ramps. See bA.70 to bA.83.
Note: Continues on the next page.							

Screen	Description	Default value	Range	Function	Set on RUN															
In.67	Digital input 3	RESET	0 to 54	Note: Comes from the previous page.	NO															
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>12</td><td>XCEL-M</td><td>Bit 1 for alternative acceleration ramps. Allows the selection of the multiple preconfigured acceleration/deceleration ramps. See bA.70 to bA.83.</td></tr><tr><td>13</td><td>RUN Enable</td><td>Sets the digital input to safe operation mode.</td></tr><tr><td>14</td><td>3 WIRE</td><td>Configure digital inputs for a behaviour with pulses. This input is configured as NC and acts as stop towards the start command. Example: DI1 = 1➡ START(+) (NO) DI2 = 14➡ 3 WIRE (NC) DI3 = 18➡ DOWN (NO) Button DI1 orders to start and the requests from DI2 are stopped. Button DI3 slows speed down.</td></tr><tr><td>15</td><td>CTR/REF 2</td><td>Enables the alternative control mode programmed in bA.4 (NO).</td></tr></table>		OPT.	DESCR.	FUNCTION	12	XCEL-M	Bit 1 for alternative acceleration ramps. Allows the selection of the multiple preconfigured acceleration/deceleration ramps. See bA.70 to bA.83.	13	RUN Enable	Sets the digital input to safe operation mode.	14	3 WIRE	Configure digital inputs for a behaviour with pulses. This input is configured as NC and acts as stop towards the start command. Example: DI1 = 1➡ START(+) (NO) DI2 = 14➡ 3 WIRE (NC) DI3 = 18➡ DOWN (NO) Button DI1 orders to start and the requests from DI2 are stopped. Button DI3 slows speed down.	15	CTR/REF 2	Enables the alternative control mode programmed in bA.4 (NO).
				OPT.		DESCR.	FUNCTION													
				12		XCEL-M	Bit 1 for alternative acceleration ramps. Allows the selection of the multiple preconfigured acceleration/deceleration ramps. See bA.70 to bA.83.													
				13		RUN Enable	Sets the digital input to safe operation mode.													
14	3 WIRE	Configure digital inputs for a behaviour with pulses. This input is configured as NC and acts as stop towards the start command. Example: DI1 = 1➡ START(+) (NO) DI2 = 14➡ 3 WIRE (NC) DI3 = 18➡ DOWN (NO) Button DI1 orders to start and the requests from DI2 are stopped. Button DI3 slows speed down.																		
15	CTR/REF 2	Enables the alternative control mode programmed in bA.4 (NO).																		
Note: Continues on the next page.																				

Screen	Description	Default value	Range	Function	Set on RUN		
In.68	Digital input 4	RESET	0 to 54	Note: Comes from the previous page.		YES	
				OPT.	DESCR.		FUNCTION
				16	EXCHANGE		This option switches motor power supply from the drive with direct network supply. To do this, digital output options 17 'Line in' and 18 'Line Co' are used. While the digital input is open, the digital output configured as 17 'Line in' remains active. Once this digital input is closed, the relay 'Line in' is disabled, waits for 500ms and enables 'Line Co'. When this digital input is disabled, 'Line Co' is disabled, waits for 500ms, enables 'Line In' and performs a speed search to synchronize with the motor. See Figure Multifunction relay configuration.
				17	UP		Assign the function to increase the speed reference through a button (NO) to the digital input. reference limits are those set in dr group.
				18	DOWN		Set digital input to decrease the speed reference by the use of a button (NO). The reference limits will be those set on dr group
Note: Continues on the next page.							

Screen	Description	Default value	Range	Function	Set on RUN
In.69	Digital input 5	MultVel-B	0 to 54	Note: Comes from the previous page.	
				OPT.	DESCR.
				20	POT CLEAR
				21	Analog HLD
				22	I-Term Clear
				23	PIDOP Loop
				24	PGain2
Note: Continues on the next page.					NO

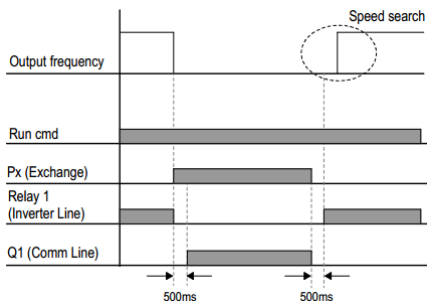
Screen	Description	Default value	Range	Function	Set on RUN		
In.70	Digital input 6	MultVel-M	0 to 54	Note: Comes from the previous page.		NO	
				OPT.	DESCR.		FUNCTION
				25	XCEL Stop		Sets the digital input to stop acceleration or deceleration. See Figure Inputs configuration for acceleration / deceleration
				26	2ndMotor		Set the digital input as 2nd motor operation, which is used when a single drive switch operates two motors.
				34	Pre-Excit		Enable the motor pre-excitation activation, before start. The user can adjust this functionality in parameters Ad.7, Ad.1 and Ad.13.
				38	TimerIN		Set the function for the temporized digital output. If option 28 "Timer-Ou" is selected in OU.31 or OU.33, the digital output will be enabled once the time set in OU.56 has elapsed. Once this digital input is disabled, the digital output will be disabled once the time set in OU.57 has elapsed.
Note: Continues on the next page.							

Screen	Description	Default value	Range	Function		Set on RUN	
In.71	Digital input 7	Mult Vel-A	0 to 54	Note: Comes from the previous page.			
				OPT.	DESCR.	FUNCTION	
				40	disAux Ref.	This digital input sets the main reference + alternative reference functionality. When drive speed is controlled by the main reference source, if this input is enabled, the speed reference will be calculated according to parameter ba.2.	
				46	INCH(+)	Enable the direct starting fix speed reference to the one set in parameter dr.11.	
				47	INCH(-)		
				49	XCEL-H	Bit 2 for alternative acceleration ramps. Allows the selection of the multiple preconfigured acceleration/deceleration ramps. See bA.70 to 83.	
				50	PLC	Enables the user to implement simple sequences using various function blocks.	
				51	FireMode	The drive runs in Fire mode when Ad.80 is set to 2 and the multifunction terminal (In 65-71) configured for Fire mode is turned on.	
				52	KEB1Sel	For kinetic energy buffering operation, select the multifunction terminal, set it to 'KEB1Sel' and enable the digital input.	
				Note: Continues on the next page.			

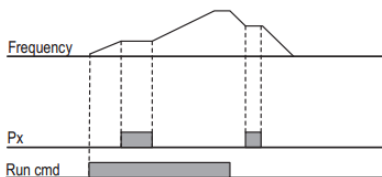
Screen	Description	Default value	Range	Function	Set on RUN	
In.71	Digital input 7	Mult Vel-A		Note: Comes from the previous page.	NO	
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>54</td><td>TI</td><td>In IP66 equipment, pulse input TI and Multi-function terminal P5 share the same terminal. In this case, set parameter In.69 to 54(TI).</td></tr></table>		OPT.
OPT.	DESCR.	FUNCTION				
54	TI	In IP66 equipment, pulse input TI and Multi-function terminal P5 share the same terminal. In this case, set parameter In.69 to 54(TI).				
In.85	Digital input activation delay	10ms	0 to 10000ms	Set the delay time when activating the digital input. In case any variation occurs within a smaller time gap, the input will remain disabled.	YES	
In.86	Digital input deactivation delay	3ms	0 to 10000ms	Set the delay time when disabling a digital input. In case any variations occur within a smaller time gap, the input will remain enabled.	YES	
In.87	Digital input contact type	00000	0000000 to 1111111	Adjust each to 0 or 1 according to the following table:	NO	
				<table><tr><th>BIT</th><th>DESCR.</th></tr><tr><td>0</td><td>Contact normally open (YES)</td></tr><tr><td>1</td><td>Contact normally closed (NC)</td></tr></table> <p>The assignment order is P1, P2, ..., P7 starting from the bit placed farthest to the right. The number of Digital Inputs varies depending on the equipment (IP20 drives integrate 7 Digital Inputs and IP66 drives integrate 5).</p>		BIT
BIT	DESCR.					
0	Contact normally open (YES)					
1	Contact normally closed (NC)					
In.89	DI scan time	1ms	1 to 5000ms	Set the time to wait before refreshing the digital inputs configured as multireference.	NO	

Screen	Description	Default value	Range	Function	Set on RUN						
In.90	Digital inputs status	00000	0000000 to 1111111	<div>Shows the status of digital inputs:</div> <table><tr><th>BIT</th><th>DESCR.</th></tr><tr><td>0</td><td>Disabled</td></tr><tr><td>1</td><td>Enabled</td></tr></table> <div>The assignment order is P1, P2, ..., P7 starting from the bit placed farthest to the right. The number of Digital Inputs varies depending on the equipment (IP20 drives integrate 7 Digital Inputs and IP66 drives integrate 5).</div>	BIT	DESCR.	0	Disabled	1	Enabled	NO
BIT	DESCR.										
0	Disabled										
1	Enabled										
In.91	TI Monitor	0.00kHz	0.00 to 50.00 kHz	This parameter shows the pulse frequency in this input.	NO						
In.92	TI Filter	10	0 to 9999	This parameter allows setting the time in which the pulse input reaches 63% of its nominal frequency. It is useful when the pulse frequency is supplied in multiple steps.	YES						
In.93	TI minimum input frequency	0.00kHz	0.00 to 32.00 kHz	<table><tr><th>PARÁM.</th><th>FUNCTION</th></tr><tr><td>In.93</td><td>This parameter allows setting the minimum input frequency through TI.</td></tr></table>	PARÁM.	FUNCTION	In.93	This parameter allows setting the minimum input frequency through TI.	YES		
PARÁM.	FUNCTION										
In.93	This parameter allows setting the minimum input frequency through TI.										
In.94	TI minimum input frequency percentage	0.00%	0.00 to 100.00%	<table><tr><td>In.94</td><td>This parameter allows setting the minimum input frequency percentage through TI.</td></tr></table>	In.94	This parameter allows setting the minimum input frequency percentage through TI.	YES				
In.94	This parameter allows setting the minimum input frequency percentage through TI.										
In.95	TI maximum input frequency	32.00kHz	0.00 to 32.00 kHz	<table><tr><td>In.95</td><td>This parameter allows setting the maximum input frequency through TI.</td></tr></table>	In.95	This parameter allows setting the maximum input frequency through TI.	YES				
In.95	This parameter allows setting the maximum input frequency through TI.										
In.96	TI maximum input frequency percentage	100.00%	0.00 to 100.00%	<table><tr><td>In.96</td><td>This parameter allows setting the maximum input frequency percentage through TI.</td></tr></table> <div>See Figure TI configuration.</div>	In.96	This parameter allows setting the maximum input frequency percentage through TI.	YES				
In.96	This parameter allows setting the maximum input frequency percentage through TI.										
In.97	TI Inverting	N	N S	This parameter allows inverting the TI signal. Set this parameter to 1 (NO) if you need a reverse signal.	YES						

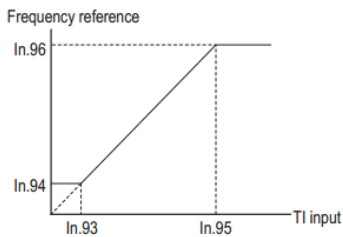
Screen	Description	Default value	Range	Function	Set on RUN										
In.98	TI noise reduction level	0.04%	0.04 to 10.00%	This parameter is used to reduce noise in the TI input signal. The quantification value is defined as the input maximum percentage value.	YES										
In.99	Input mode setting	00	00 to 11	Software status. Set each bit to 0 or 1 according to the following table: <table><tr><th>BIT</th><th>DESCR.</th></tr><tr><td>00</td><td>V2, NPN</td></tr><tr><td>01</td><td>V2, PNP</td></tr><tr><td>10</td><td>I2, NPN</td></tr><tr><td>11</td><td>I2, PNP</td></tr></table>	BIT	DESCR.	00	V2, NPN	01	V2, PNP	10	I2, NPN	11	I2, PNP	NO
BIT	DESCR.														
00	V2, NPN														
01	V2, PNP														
10	I2, NPN														
11	I2, PNP														



Multifunction relay configuration



Inputs configuration for acceleration / deceleration

*TI configuration*

Group 6: Outputs → OU

Screen	Description	Default value	Range	Function	Set on RUN																					
OU.1	Analog output 1 mode selection	Frequency	0 to 15	The analog output 1 is programmable according to the following table:	YES																					
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>Frequency</td><td>Proportional signal to the motor speed. For the maximum frequency defined in M2.20, analogue value will be 10V/20mA.</td></tr><tr><td>1</td><td>O/pCurr</td><td>Proportional signal to the motor current. 10V/20mA are generated when the drive rated current is at 200%.</td></tr><tr><td>2</td><td>O/pVolt</td><td>Proportional signal to the motor voltage. For the voltage value defined in bA.15, analogue value will be 10V/20mA.</td></tr><tr><td>3</td><td>DCLink V</td><td>Proportional signal to the bus DC voltage. The analogue output is 10V/20mA when the DC voltage is 410Vdc for 220Vac drives and 820Vdc for 400Vac drives.</td></tr><tr><td>4</td><td>Torque</td><td>Proportional signal to the generated torque. Outputs 10V/20mA at 250% of motor rated torque.</td></tr><tr><td>5</td><td>O / pPower</td><td>Proportional signal to the output power. 10V/20mA are generated operating 200% of the nominal power.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	Frequency	Proportional signal to the motor speed. For the maximum frequency defined in M2.20, analogue value will be 10V/20mA.	1	O/pCurr	Proportional signal to the motor current. 10V/20mA are generated when the drive rated current is at 200%.	2	O/pVolt	Proportional signal to the motor voltage. For the voltage value defined in bA.15, analogue value will be 10V/20mA.	3	DCLink V	Proportional signal to the bus DC voltage. The analogue output is 10V/20mA when the DC voltage is 410Vdc for 220Vac drives and 820Vdc for 400Vac drives.	4	Torque	Proportional signal to the generated torque. Outputs 10V/20mA at 250% of motor rated torque.	5	O / pPower	Proportional signal to the output power. 10V/20mA are generated operating 200% of the nominal power.
				OPT.		DESCR.	FUNCTION																			
				0		Frequency	Proportional signal to the motor speed. For the maximum frequency defined in M2.20, analogue value will be 10V/20mA.																			
				1		O/pCurr	Proportional signal to the motor current. 10V/20mA are generated when the drive rated current is at 200%.																			
				2		O/pVolt	Proportional signal to the motor voltage. For the voltage value defined in bA.15, analogue value will be 10V/20mA.																			
				3		DCLink V	Proportional signal to the bus DC voltage. The analogue output is 10V/20mA when the DC voltage is 410Vdc for 220Vac drives and 820Vdc for 400Vac drives.																			
				4		Torque	Proportional signal to the generated torque. Outputs 10V/20mA at 250% of motor rated torque.																			
5	O / pPower	Proportional signal to the output power. 10V/20mA are generated operating 200% of the nominal power.																								
Note: Continues on the next page.																										

Screen	Description	Default value	Range	Function	Set on RUN																														
				Note: Comes from the previous page																															
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>6</td><td>Idse</td><td>Maximum current at 200% of no load current.</td></tr><tr><td>7</td><td>Iqse</td><td>Maximum current at 250% of rated torque current.</td></tr><tr><td>8</td><td>Target Fq</td><td>Proportional signal to the target frequency set in the drive.</td></tr><tr><td>9</td><td>Ramp Freq</td><td>Proportional signal to the frequency which has executed the acceleration and deceleration functions and it can be different to the real output frequency.</td></tr><tr><td>10</td><td>SpeedFdb</td><td>Real motor speed.</td></tr><tr><td>12</td><td>PIDRef Val</td><td>PID reference value signal. Generates 6.6V working to the 100% of the reference.</td></tr><tr><td>13</td><td>PIDFdb Val</td><td>Signal proportional to the feedback in PID mode. Generates 6.6V at 100% of the reference value.</td></tr><tr><td>14</td><td>PIDO/p</td><td>Signal proportional to the PID controller output value. Generates 5V at 100% of the reference value.</td></tr><tr><td>15</td><td>Constant</td><td>Value of OU.5.</td></tr></table>	OPT.	DESCR.	FUNCTION	6	Idse	Maximum current at 200% of no load current.	7	Iqse	Maximum current at 250% of rated torque current.	8	Target Fq	Proportional signal to the target frequency set in the drive.	9	Ramp Freq	Proportional signal to the frequency which has executed the acceleration and deceleration functions and it can be different to the real output frequency.	10	SpeedFdb	Real motor speed.	12	PIDRef Val	PID reference value signal. Generates 6.6V working to the 100% of the reference.	13	PIDFdb Val	Signal proportional to the feedback in PID mode. Generates 6.6V at 100% of the reference value.	14	PIDO/p	Signal proportional to the PID controller output value. Generates 5V at 100% of the reference value.	15	Constant	Value of OU.5.	
OPT.	DESCR.	FUNCTION																																	
6	Idse	Maximum current at 200% of no load current.																																	
7	Iqse	Maximum current at 250% of rated torque current.																																	
8	Target Fq	Proportional signal to the target frequency set in the drive.																																	
9	Ramp Freq	Proportional signal to the frequency which has executed the acceleration and deceleration functions and it can be different to the real output frequency.																																	
10	SpeedFdb	Real motor speed.																																	
12	PIDRef Val	PID reference value signal. Generates 6.6V working to the 100% of the reference.																																	
13	PIDFdb Val	Signal proportional to the feedback in PID mode. Generates 6.6V at 100% of the reference value.																																	
14	PIDO/p	Signal proportional to the PID controller output value. Generates 5V at 100% of the reference value.																																	
15	Constant	Value of OU.5.																																	

Screen	Description	Default value	Range	Function	Set on RUN								
OU.2	Analog output 1 gain	100.0%	-1000.0 to 1000.0%	<p>These parameters allow adjusting the gain and offset level of the analogue output 1. If a current signal is desired, the set value will be 20%.</p> <p>For example, when the analogue output is configured as 'Frequency', the equation that governs the operation is:</p> $AO1 = \frac{Frequency}{MaxFreq} \times Gain\ AO1 + Offset\ AO1$ <p>where Gain AO1 is set in parameter OU.2 and Offset AO1 is set in parameter OU.3.</p>	YES								
OU.3	Analog output 1 offset	0.0%	-100.0 to 100.0%		YES								
OU.4	Analog output 1 filter	5ms	0 to 10000ms	<p>Filter for the analog output 1 value.</p> <p>Occasionally, the analog signal is slightly unstable. It can be improved selecting another filter value.</p> <p>Note: The use of a filter can add a slight delay within the analog output.</p>	YES								
OU.5	Analog output 1 constant setting	0.0%	0.0 to 100.0%	Set a constant speed in the analog output 1, whenever it has been configured as 'Constant' in parameter OU.1.	YES								
OU.6	Analog output 1 monitor	0.0%	0.0 to 1000.0%	Analog output 1 monitor.	YES								
OU.30	Relay fault output	010	000 to 111	<p>This parameter allows setting when the relay output is set as 29 'FAULT':</p> <table><tr><th>OPC</th><th>FUNCTION</th></tr><tr><td>001</td><td>Fault due to low voltage.</td></tr><tr><td>010</td><td>Any faults other than low voltage.</td></tr><tr><td>100</td><td>Automatic restart final failure. Final fault automatic restart. The relay will enable whenever all restart attempts (Pr.9) have been carried out or time set in Pr.10 has elapsed.</td></tr></table>	OPC	FUNCTION	001	Fault due to low voltage.	010	Any faults other than low voltage.	100	Automatic restart final failure. Final fault automatic restart. The relay will enable whenever all restart attempts (Pr.9) have been carried out or time set in Pr.10 has elapsed.	YES
OPC	FUNCTION												
001	Fault due to low voltage.												
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Screen	Description	Default value	Range	Function	Set on RUN																					
OU.31	Relay 1 control source	Trip	0 to 40	Configures each relay and digital output according to the following table:	YES																					
				<table><tr><th>OPT.</th><th>DESC.</th><th>FUNCTION</th></tr><tr><td>0</td><td>None</td><td>The output has no effect.</td></tr><tr><td>1</td><td>FDT-1</td><td>Check when the output frequency has reached the user defined frequency. The relay will be enabled if the following equation is satisfied: $F_{output} > frequency - (Pr.2 / 2)$.</td></tr><tr><td>2</td><td>FDT-2</td><td>The relay is active whenever the reference frequency is set to Pr.1 and is Pr.2 in bandwidth</td></tr><tr><td>3</td><td>FDT-3</td><td>The relay will enable in the frequencies: $Pr.1 - (Pr.2/2)$ to $Pr.1 + (Pr.2/2)$.</td></tr><tr><td>4</td><td>FDT-4</td><td>The relay will be active whenever the output frequency is greater than Pr.1 remains closed until it decreases below $Pr.1 - (Pr.2/2)$.</td></tr><tr><td>5</td><td>Over Load</td><td>The relay will be active when the motor is in overload.</td></tr></table>		OPT.	DESC.	FUNCTION	0	None	The output has no effect.	1	FDT-1	Check when the output frequency has reached the user defined frequency. The relay will be enabled if the following equation is satisfied: $F_{output} > frequency - (Pr.2 / 2)$.	2	FDT-2	The relay is active whenever the reference frequency is set to Pr.1 and is Pr.2 in bandwidth	3	FDT-3	The relay will enable in the frequencies: $Pr.1 - (Pr.2/2)$ to $Pr.1 + (Pr.2/2)$.	4	FDT-4	The relay will be active whenever the output frequency is greater than Pr.1 remains closed until it decreases below $Pr.1 - (Pr.2/2)$.	5	Over Load	The relay will be active when the motor is in overload.
				OPT.		DESC.	FUNCTION																			
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Note: continues in the next page.																										

Screen	Description	Default value	Range	Function	Set on RUN																											
				<p>Note: comes from the previous page</p> <table><tr><th>OPT.</th><th>DESC.</th><th>FUNCTION</th></tr><tr><td>6</td><td>IOL</td><td>The relay will be active in case a fault due to overload protection occurs.</td></tr><tr><td>7</td><td>Undr Load</td><td>The relay will be active in case of an underload warning.</td></tr><tr><td>8</td><td>VentWarn</td><td>The relay will be active in case a fan fault occurs and parameter Pr.79 is set as 1 'WARN'.</td></tr><tr><td>9</td><td>Stall</td><td>Digital output will be enable when the motor is blocked and overcharged.</td></tr><tr><td>10</td><td>OverVoltage</td><td>The relay will enable whenever the drive DC bus voltage is higher than the protection voltage.</td></tr><tr><td>11</td><td>LowVoltage</td><td>The relay will be active whenever the drive DC link voltage drops below the low voltage protection level.</td></tr><tr><td>12</td><td>Over Heat</td><td>The relay will enable when the drive temperature reaches a dangerous level.</td></tr><tr><td>13</td><td>Lost Command</td><td>Communications have been interrupted.</td></tr></table>	OPT.	DESC.	FUNCTION	6	IOL	The relay will be active in case a fault due to overload protection occurs.	7	Undr Load	The relay will be active in case of an underload warning.	8	VentWarn	The relay will be active in case a fan fault occurs and parameter Pr.79 is set as 1 'WARN'.	9	Stall	Digital output will be enable when the motor is blocked and overcharged.	10	OverVoltage	The relay will enable whenever the drive DC bus voltage is higher than the protection voltage.	11	LowVoltage	The relay will be active whenever the drive DC link voltage drops below the low voltage protection level.	12	Over Heat	The relay will enable when the drive temperature reaches a dangerous level.	13	Lost Command	Communications have been interrupted.	
OPT.	DESC.	FUNCTION																														
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Screen	Description	Default value	Range	Function	Set on RUN																								
				<p>Note: comes from the previous page</p> <table><tr><th>OPT.</th><th>DESC.</th><th>FUNCTION</th></tr><tr><td>14</td><td>Run</td><td>The relay will enable with the start command. However, it will not enable during the DC brake.</td></tr><tr><td>15</td><td>Stop</td><td>The relay will always enable whenever no start command has been sent and no output voltage is present within the drive.</td></tr><tr><td>16</td><td>Steady</td><td>The relay will enable when the reference frequency matches the output frequency, this is, when the drive has reached the reference frequency.</td></tr><tr><td>17</td><td>Inv. Line</td><td>Outputs a signal while the motor is driven by the inverter line</td></tr><tr><td>18</td><td>Comm Line</td><td>Outputs a signal while the motor is controlled from the communications network. See option 16 "Exchange" of digital inputs configuration (parameters In.65-71).</td></tr><tr><td>19</td><td>Spd Srch</td><td>The relay will be active during a speed search operation.</td></tr><tr><td>22</td><td>Ready</td><td>The relay will enable whenever the drive is ready to start (without any warnings or trips).</td></tr></table>	OPT.	DESC.	FUNCTION	14	Run	The relay will enable with the start command. However, it will not enable during the DC brake.	15	Stop	The relay will always enable whenever no start command has been sent and no output voltage is present within the drive.	16	Steady	The relay will enable when the reference frequency matches the output frequency, this is, when the drive has reached the reference frequency.	17	Inv. Line	Outputs a signal while the motor is driven by the inverter line	18	Comm Line	Outputs a signal while the motor is controlled from the communications network. See option 16 "Exchange" of digital inputs configuration (parameters In.65-71).	19	Spd Srch	The relay will be active during a speed search operation.	22	Ready	The relay will enable whenever the drive is ready to start (without any warnings or trips).	
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Screen	Description	Default value	Range	Function	Set on RUN																																	
				<p>Note: comes from the previous page</p> <table><tr><th>OPT.</th><th>DESC.</th><th>FUNCTION</th></tr><tr><td>28</td><td>Timer Out</td><td>The relay will be enabled after the set time has elapsed.</td></tr><tr><td>29</td><td>Trip</td><td>Relay is enabled when a fault trip occurs.</td></tr><tr><td>31</td><td>DBWarn %ED</td><td>Sets the configuration of the braking resistor (%ED: Duty cycle).</td></tr><tr><td>34</td><td>Comparat</td><td>Sends a signal using the value of the digital input.</td></tr><tr><td>35</td><td>BRCtrl</td><td>Used to control the brake opening.</td></tr><tr><td>36</td><td>CAP Exch.</td><td>The relay will enable CAP exchange options according to the setting of Pr.62.</td></tr><tr><td>37</td><td>FAN Exch.</td><td>The relay will enable FAN exchange according to the setting of Pr.87.</td></tr><tr><td>38</td><td>Fire Mode</td><td>Fire mode configuration.</td></tr><tr><td>39</td><td>TO</td><td>Sends pulse signals to external devices to provide a single output value of output frequency, output current, output voltage or DC voltage.</td></tr><tr><td>40</td><td>KEB Op</td><td>The relay will be active when the energy buffering operation has started because of low voltage of the drive DC power section due to a power failure on the input power.</td></tr></table>	OPT.	DESC.	FUNCTION	28	Timer Out	The relay will be enabled after the set time has elapsed.	29	Trip	Relay is enabled when a fault trip occurs.	31	DBWarn %ED	Sets the configuration of the braking resistor (%ED: Duty cycle).	34	Comparat	Sends a signal using the value of the digital input.	35	BRCtrl	Used to control the brake opening.	36	CAP Exch.	The relay will enable CAP exchange options according to the setting of Pr.62.	37	FAN Exch.	The relay will enable FAN exchange according to the setting of Pr.87.	38	Fire Mode	Fire mode configuration.	39	TO	Sends pulse signals to external devices to provide a single output value of output frequency, output current, output voltage or DC voltage.	40	KEB Op	The relay will be active when the energy buffering operation has started because of low voltage of the drive DC power section due to a power failure on the input power.	
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OU.33	Digital output 1 function	Run	0 to 35	See parameter OU.31.	YES																																	

Screen	Description	Default value	Range	Function	Set on RUN										
OU.41	Digital outputs status	00	00 to 11	Multi-function output monitor.	YES										
				<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>00</td><td>No outputs enabled</td></tr><tr><td>01</td><td>Output 1 enabled</td></tr><tr><td>10</td><td>Output 1 enabled</td></tr><tr><td>11</td><td>Output 1 and 2 enabled</td></tr></table>		OPT.	FUNCTION	00	No outputs enabled	01	Output 1 enabled	10	Output 1 enabled	11	Output 1 and 2 enabled
				OPT.		FUNCTION									
				00		No outputs enabled									
				01		Output 1 enabled									
10	Output 1 enabled														
11	Output 1 and 2 enabled														
OU.50	Digital output connection delay	0.00s	0.00 to 100.00s	The user can specify a delay in the digital output 1 and relays disconnection. If during the connection delay time the activation condition disappears, the relay will not be enabled.	YES										
OU.51	Digital output disconnection delay	0.00s	0.00 to 100.00s	The user can specify a delay within the digital output 1 and relays disconnection. If during the disconnection delay time, the disable condition disappears, the relay will not be disabled.	YES										
OU.52	NC/NO Relays logic	00	00 to 11	Defines the type of contact following this order: Digital Output 1, Relay 2 and Relay 1, from left to right according to the bit assignment.	NO										
				<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>0</td><td>Contact normally open (NO)</td></tr><tr><td>1</td><td>Contact normally closed (NC)</td></tr></table>		OPT.	FUNCTION	0	Contact normally open (NO)	1	Contact normally closed (NC)				
				OPT.		FUNCTION									
0	Contact normally open (NO)														
1	Contact normally closed (NC)														
OU.53	Digital output connection delay on fault	0.00s	0.00 to 100.00s	If a fault trip occurs, trip relay or multi-function output operates after the time delay set in OU.53. Terminal is off with the input initialized after the time delay set in OU.54.	YES										
OU.54	Digital output disconnection delay on fault	0.00s	0.00 to 100.00s		YES										
OU.55	Digital output connection delay	0.00s	0.00 to 100.00s	Input a signal (On) to the timer terminal to operate a timer output (Timer out) after the time set at OU.55 has passed. When the multi-function input terminal is off, multi-function output or relay turns off after the time set at OU.56. See also digital inputs option 38 'Timer In'.	YES										
OU.56	Digital output disconnection delay	0.00s	0.00 to 100.00s		YES										

Screen	Description	Default value	Range	Function	Set on RUN			
OU.57	Relay FDT level	30.00Hz	0.00 to dr.20	Value of the output frequency for digital outputs FDT options.	YES			
OU.58	Relay FDT band	10.00Hz	0.00 to dr.20	Detection frequency band for digital outputs FDT options.	YES			
OU.61	Pulse output mode	Frequency	0 to 15	Pulse output setting.		YES		
				OPT.	FUNCTION		OPT.	FUNCTION
				0	Frequency		8	TargetFq
				1	O/pCurr		9	RampFreq
				2	O/pVolt		10	SpeedFdb
				3	DCLinkV		12	PIDRefVal
				4	Torque		13	PIDFdbVal
				5	O/pPower		14	PIDO/p
				6	Idse		15	Constant
				7	Iqse			
OU.62	Pulse output gain	100.0%	-1000.0 to 1000.0%	Adjusts output value and offset. If frequency is selected as an output, it will operate according to the following equation:	YES			
OU.63	Pulse output offset	0.0%	-100.0 to 100.0%	$T0 = \frac{Frequency}{MaxFreq} \times TO\ gain \times TO\ Bias$	YES			
OU.64	Pulse output filter	5ms	0 to 10000ms	Sets filter time constant on analog output.	YES			
OU.65	Pulse output constant setting	0.0%	0.0 to 100.0%	If analog output item is set to constant, the analog pulse output is dependent on the set parameter values.	YES			
OU.66	Pulse output monitor	0.0%	0.0 to 1000.0%	Monitors analog output value. Displays the maximum output pulse (32kHz) as a percentage (%) of the standard.	YES			

Group 7: Communication Bus → CM

Screen	Description	Default value	Range	Function	Set on RUN									
CM.1	Slave address	1	1 to 250	Drive identifier to communicate within the network. When communicating with several equipment, each one should have a different address.	YES									
CM.2 ^[27]	Communication protocol	Modbus	Modbus PE BUS 485	Select the communication protocol:	YES									
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>Modbus</td><td>Communication protocol compatible with Modbus-RTU</td></tr><tr><td>2</td><td>PE BUS 485</td><td>Communication protocol used to communicate drives.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	Modbus	Communication protocol compatible with Modbus-RTU	2	PE BUS 485	Communication protocol used to communicate drives.
				OPT.		DESCR.	FUNCTION							
0	Modbus	Communication protocol compatible with Modbus-RTU												
2	PE BUS 485	Communication protocol used to communicate drives.												
CM.3 ^[27]	Baud rate	9600bps	1200 bps 2400 bps 4800 bps 9600 bps 19200 bps 38400 bps 56 kbps 115200 bps	Sets the Modbus communications transfer rate, which must match with the bus communication master within the drive.	YES									

[27] Will not be displayed when P2P and MultiKD is set.

Screen	Description	Default value	Range	Function	Set on RUN		
CM.4 ^[27]	Communication frame structure	D8/PN/S1 D8/PN/S2 D8/PE/S1 D8/PO/S1	D8/PN/S1 D8/PN/S2 D8/PE/S1 D8/PO/S1	Select the communication frame structure and defines the data length, parity confirmation method and the number of stop bits:		YES	
				OPT	DESCR.		FUNCTION
				0	D8 / PN/S1		8-bit data / no parity check / 1 stop bit
				1	D8 / PN/S2		8-bit data / no parity check / 2 stop bits
				2	D8/ PE/S1		8-bit data / even parity / 1 stop bit
				3	D8/PO/ S1		8-bit data / odd parity / 1 stop bit
CM.5 ^[27]	Response delay	5ms	0 to 100 ms	The MODBUS-RTU communication plays the role of the slave device. The slave will reply after the time period set in this parameter. This allows the master device attending the communications within a system where the master cannot manage a quick slave answer.	YES		
CM.6 ^[28]	Communication option S/W version	0.00	-	Show the software version of the optional communications card, if there is any connected.	YES		
CM.7 ^[28]	Communication option ID	1	0 to 255	Identifier of the communications card connected to the drive.	YES		
CM.8 ^[28]	Card baud rate	12Mbps	-	Communications card baud rate.	YES		
CM.9 ^[28]	Communication option LED status	-	-	This parameter function depends on the communications card.	YES		

[28] Will only be displayed when a communications optional card is installed.

Screen	Description	Default value	Range	Function	Set on RUN
CM.30	Output parameters number	3	0 to 8	Configure a group of addresses to read several output parameters at once. The user must set the number of parameters and then configure them in CM.31-38.	YES
CM.31 [29]	Output communication addresses 1 to 8	40011	0 to 65535	Define the output parameter group for data transmission, so that addresses configured in CM.31-38 can be used to send several parameters at once in the same communications frame. The size of the group is set in CM.30	YES
CM.32 [29]		40012			YES
CM.33 [29]		40013			YES
CM.34 [29]		40001			YES
CM.35 [29]		40001			YES
CM.36 [29]		40001			YES
CM.37 [29]		40001			YES
CM.38 [29]		40001			YES

[29] Only parameters corresponding to the value set in CM.30 will be shown (E.g., if CM.30 = 3, parameters CM.31, CM.32 and CM.33 will be shown).

Screen	Description	Default value	Range	Function	Set on RUN
CM.50	Number of input parameters	2	0 to 8	Configure a group of addresses to read several input parameters at once. The user must set the number of parameters and then configure them in CM.51-58.	YES
CM.51 [30]	Input communication addresses 1 to 8	40006	0 to 65535	Define the input parameter group for data transmission, so that addresses configured in CM.51-58 can be used to send several parameters at once in the same communications frame. The size of the group is set in CM.50	NO
CM.52 [30]		40007			NO
CM.53 [30]		40001			NO
CM.54 [30]		40001			NO
CM.55 [30]		40001			NO
CM.56 [30]		40001			NO
CM.57 [30]		40001			NO
CM.58 [30]		40001			NO
CM.68	Field bus data swap	NO	NO YES	Swap the most significant byte with the least significant byte in order to adapt to the PLC configuration.	NO
CM.70	Communication multifunction input 1 to 7	None	0 to 54	Multi-function inputs can be controlled by using the communication address 40902. Configure parameters CM.70-77 and then set the corresponding bit in address 40803 for them to operate. These inputs operate independently from those set in In.65-71.	YES
CM.71		None			YES

[30] Only parameters corresponding to the value set in CM.50 will be shown (E.g., if CM.50 = 2, parameters CM.51 and CM.52 will be shown).

Screen	Description	Default value	Range	Function				Set on RUN
CM.72		None		OPT.	DESCR.	OPT.	DESCR.	YES
		0		None	20	POT CLEAR		
CM.73		None		1	START(+)	21	Analog HLD	YES
				2	START(-)	22	I-Term Clear	
				3	RESET	23	PIDOP Loop	
CM.74		None		4	EXTTRIP	24	PGain2	YES
				5	DISSTART	25	XCELStop	
				6	INCH1	26	2ndMotor	
CM.75		None		7	SPEED-L	34	Pre-Excit	YES
				8	SPEED-M	38	TimerIN	
				9	SPEED-H	40	disAuxRef.	
				11	XCEL-L	46	INCH(+)	
CM.76		None		12	XCEL-M	47	INCH(-)	YES
				13	RUN Enable	49	XCEL-H	
				14	3-WIRE	50	PLC	
CM.77		None		15	CTR/REF2	51	FireMode	YES
				16	Exchange	52	KEB1Sel	
				17	UP	54	TI	
	18		DOWN					
Note: See parameters In.65-71, to consult detailed information about each option.								
CM.86	Communication multifunction input monitoring	0	-	Monitor inputs configured in CM.70-77.				NO
CM.90	Data frame comm. monitor	PE BUS 485	PE BUS 485 Ext display	Monitor data frames status through the communication bus or the removable display.				YES
CM.91	Received data frames counter	0	0 to 65535	Count the number of frames correctly received.				YES
CM.92	Frames with error counter	0	0 to 65535	Count the number frames received with errors.				YES

Screen	Description	Default value	Range	Function	Set on RUN										
CM.93	NAK frames	0	0 to 65535	Count the number frames received with timeout.	YES										
CM.94 [31]	Communications update	N	NO SI	This parameter enables sending the current drive data configuration to the communications card.	NO										
CM.95	P2P communication selection	Disable All	0 to 3	<p>P2P communication allows sharing input devices between different drives. To enable it, RS485 communication must be active.</p> <p>This parameter allows defining which devices will be master and which slave in the P2P communication.</p> <table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>0</td><td>Disable All</td></tr><tr><td>1</td><td>P2P Master</td></tr><tr><td>2</td><td>P2P Slave</td></tr><tr><td>3</td><td>M-KPD Ready</td></tr></table>	OPT.	FUNCTION	0	Disable All	1	P2P Master	2	P2P Slave	3	M-KPD Ready	NO
OPT.	FUNCTION														
0	Disable All														
1	P2P Master														
2	P2P Slave														
3	M-KPD Ready														
CM.96 [32]	Digital output selection	NO	000 to 111	<p>When multi-function outputs are used, a drive configured as P2P slave can choose whether to use its own output or the drive's output.</p> <table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>001</td><td>Analog output</td></tr><tr><td>010</td><td>Multi-function relay</td></tr><tr><td>100</td><td>Multi-function output</td></tr></table>	OPT.	FUNCTION	001	Analog output	010	Multi-function relay	100	Multi-function output	YES		
OPT.	FUNCTION														
001	Analog output														
010	Multi-function relay														
100	Multi-function output														

[31] Only shown if an optional communications card has been connected.

[32] Displayed when AP.1 is set to 2 (Proc PID).

Group 8: PID → AP

Screen	Description	Default value	Range	Function	Set on RUN
AP.1	Application function selection	Proc PID	Nada Proc PID	Application function selection. Set this parameter to '2' (Proc PID) to select functions for the process PID.	NO
AP.2	Enable PLC mode	N	NO YES	Display the parameter groups related to a user sequence.	NO
AP.16 [32]	PID output	+0.00%	-327.68 to 327.68%	Display the existing output value of the PID controller. The unit, gain, and scale set at AP.42-44 are applied.	YES
AP.17 [32]	PID reference	+50.00%	-327.68 to 327.68%	Display the existing reference value set for the PID controller. The unit, gain, and scale set at AP.42-44 are applied.	YES
AP.18 [32]	PID feedback	+0.00%	-327.68 to 327.68%	Display the input value of the PID controller that is included in the latest feedback. The unit, gain, and scale set at AP.42-44 are applied.	YES
AP.19 [32]	PID local	+50.00%	-100.00 to 100.00%	When AP.20 is set to 0 (MREF), the reference value can be entered. If the reference source is set to any other value, the setting values for AP.19 are voided.	YES

Screen	Description	Default value	Range	Function	Set on RUN																											
AP.20 <small>[32]</small>	Select PID regulator source	MREF	0 to 11	Select the source to introduce the PID regulator set point:	NO																											
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>MREF</td><td>PID set point introduced from keypad.</td></tr><tr><td>1</td><td>V1</td><td>PID set point introduced by the voltage analog input 1.</td></tr><tr><td>3</td><td>V2</td><td>PID set point introduced by the voltage analog input 2.</td></tr><tr><td>4</td><td>I2</td><td>PID set point introduced by the current analog input 2.</td></tr><tr><td>5</td><td>MODBUS</td><td>PID set point introduced through the Modbus communication protocol.</td></tr><tr><td>7</td><td>COMMS</td><td>PID set point introduced through any of the optional communication boards.</td></tr><tr><td>8</td><td>PLC</td><td>PID set point introduced through PLC.</td></tr><tr><td>11</td><td>PULSE</td><td>Reference signal through the pulse input.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	MREF	PID set point introduced from keypad.	1	V1	PID set point introduced by the voltage analog input 1.	3	V2	PID set point introduced by the voltage analog input 2.	4	I2	PID set point introduced by the current analog input 2.	5	MODBUS	PID set point introduced through the Modbus communication protocol.	7	COMMS	PID set point introduced through any of the optional communication boards.	8	PLC	PID set point introduced through PLC.	11	PULSE	Reference signal through the pulse input.
				OPT.		DESCR.	FUNCTION																									
				0		MREF	PID set point introduced from keypad.																									
				1		V1	PID set point introduced by the voltage analog input 1.																									
				3		V2	PID set point introduced by the voltage analog input 2.																									
				4		I2	PID set point introduced by the current analog input 2.																									
				5		MODBUS	PID set point introduced through the Modbus communication protocol.																									
				7		COMMS	PID set point introduced through any of the optional communication boards.																									
				8		PLC	PID set point introduced through PLC.																									
11	PULSE	Reference signal through the pulse input.																														
Note: In case an unavailable option is selected, the parameter will return to its previous value.																																

[32] Displayed when AP.1 is set to 2 (Proc PID).

Screen	Description	Default value	Range	Function	Set on RUN																								
AP.21 [32]	Select feedback signal source	V1	0 to 6	Select the source through which the feedback signal will be introduced to close the control loop.	NO																								
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>V1</td><td>Feedback signal by voltage analog input 1.</td></tr><tr><td>2</td><td>V2</td><td>Feedback signal by voltage analog input 2.</td></tr><tr><td>3</td><td>I2</td><td>Feedback signal by current analog input 2.</td></tr><tr><td>4</td><td>MODBUS</td><td>Feedback signal through Modbus communications integrated in the drive.</td></tr><tr><td>6</td><td>COMMS</td><td>Feedback signal through any optional communication boards.</td></tr><tr><td>7</td><td>PLC</td><td>Feedback signal through the equipment's PLC.</td></tr><tr><td>10</td><td>PULSE</td><td>Feedback signal through the pulse input.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	V1	Feedback signal by voltage analog input 1.	2	V2	Feedback signal by voltage analog input 2.	3	I2	Feedback signal by current analog input 2.	4	MODBUS	Feedback signal through Modbus communications integrated in the drive.	6	COMMS	Feedback signal through any optional communication boards.	7	PLC	Feedback signal through the equipment's PLC.	10	PULSE	Feedback signal through the pulse input.
				OPT.		DESCR.	FUNCTION																						
				0		V1	Feedback signal by voltage analog input 1.																						
				2		V2	Feedback signal by voltage analog input 2.																						
				3		I2	Feedback signal by current analog input 2.																						
				4		MODBUS	Feedback signal through Modbus communications integrated in the drive.																						
				6		COMMS	Feedback signal through any optional communication boards.																						
				7		PLC	Feedback signal through the equipment's PLC.																						
				10		PULSE	Feedback signal through the pulse input.																						
Note: In case an unavailable option is selected, the parameter will return to its previous value.																													
AP.22 [32]	PID controller proportional gain	+50.00%	0.0 to 1000.0%	Set the value of the proportional gain controller. This value should be increased whenever a greater control response is needed. Note: Increasing too much this value can cause a greater system instability.	YES																								
AP.23 [32]	PID controller integration time	10.0ms	0 to 200.0s	Set the regulator integration time. In case greater precision is needed, increase this value. Note: Increasing this value may slow down the system.	YES																								

Screen	Description	Default value	Range	Function	Set on RUN						
AP.24 [32]	PID controller differential time	0ms	0 to 10000ms	Set the regulator differential time. Whenever a greater response is needed, this value can be increased. Note: Increasing too much this value can cause a precision loss.	YES						
AP.25 [32]	PID output fine adjustment	+0.0%	0.0 to 1000.0%	Apply a fine adjustment at the PID output. Use this parameter when an adjustment for the proportional constant below 0.1% is required.	YES						
AP.26 [32]	Proportional gain scale	100.0%	0.0 to 100.0%	This parameter, along with AP.22 allow setting output ratio for errors between reference and feedback. If AP.22 is set to 50%, then 50% of the error is output. For ratios below 0.1% use AP.26.	NO						
AP.27 [32]	PID Filter	0ms	0 to 10000ms	Used when the output of the PID controller changes too fast or the entire system is unstable, due to severe oscillation. In general, a lower value (default value=0) is used to speed up response time, but in some cases a higher value increases stability. The higher the value, the more stable the PID controller output is, but the slower the response time.	YES						
AP.28 [32]	PID mode	Process	Process Normal	Set PID Mode. <table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>0</td><td>Process</td></tr><tr><td>1</td><td>Normal</td></tr></table>	OPT.	FUNCTION	0	Process	1	Normal	NO
OPT.	FUNCTION										
0	Process										
1	Normal										
AP.29 [32]	Upper limit PID output	+60.00 Hz	AP.30 to 300.00 Hz	Set the PID output upper limit.	YES						
AP.30 [32]	Lower limit PID output	-60.00Hz	-300.00 Hz to AP.29	Set the PID output lower limit.	YES						

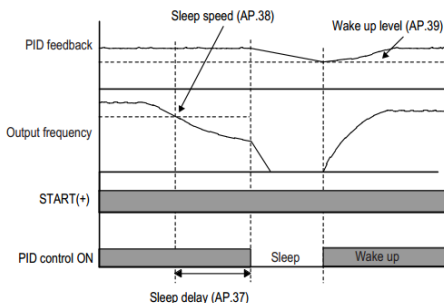
[32] Displayed when AP.1 is set to 2 (Proc PID).

Screen	Description	Default value	Range	Function	Set on RUN						
AP.31 [32]	Invert PID	N	0: NO 1: YES	Define whether to invert the PID output or not.	NO						
				<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>NO</td><td>The PID regulator answers in normal mode. Therefore, when the feedback value exceeds the reference signal, it will decrease its speed. However, if the feedback is lower than the reference signal value, the speed will be increased.</td></tr><tr><td>SI</td><td>The PID regulator answers in inverse mode. Therefore, when the feedback exceeds the reference signal, speed will be increased. However, when the feedback value is lower than the reference signal, the speed will be decreased.</td></tr></table>		OPT.	FUNCTION	NO	The PID regulator answers in normal mode. Therefore, when the feedback value exceeds the reference signal, it will decrease its speed. However, if the feedback is lower than the reference signal value, the speed will be increased.	SI	The PID regulator answers in inverse mode. Therefore, when the feedback exceeds the reference signal, speed will be increased. However, when the feedback value is lower than the reference signal, the speed will be decreased.
				OPT.		FUNCTION					
NO	The PID regulator answers in normal mode. Therefore, when the feedback value exceeds the reference signal, it will decrease its speed. However, if the feedback is lower than the reference signal value, the speed will be increased.										
SI	The PID regulator answers in inverse mode. Therefore, when the feedback exceeds the reference signal, speed will be increased. However, when the feedback value is lower than the reference signal, the speed will be decreased.										
AP.32 [32]	PID output scale	+100.00 %	0.1 to 1000.0%	Set the PID regulator output magnitude.	NO						
AP.34 [32]	PrePID reference	0.00Hz	0.00 to dr.20	Set PID controller motion frequency. Pre-PID function allows configuring the drive to start at a fixed speed AP.34 until PID feedback is above the set level (AP.35). If at a determined moment (AP.36) the drive does not reach the feedback level set in AP.35, fault F23 'Pipe Fill Flt' will be triggered	NO						
AP.35	PrePID end reference	0.0%	0.0 to 100.0%	Set feedback level in PID mode.	NO						
AP.36	PrePID delay	600s	0 to 9999s	Set the PrePID time before triggering a fault F23 'Pipe Fill Flt'.	YES						
AP.37	Sleep mode activation delay	60.0s	0.0 to 999.9s	Set the delay time before enabling the sleep mode. If the drive operates at a speed value under the value of AP.38, it will stop running and enter in sleep mode.	YES						


Screen	Description	Default value	Range	Function	Set on RUN																																
AP.38	Sleep mode activation speed	0.00Hz	0.00Hz to dr.20	Set the speed under which if a time period greater than the one defined in parameter AP.37, the drive will stop operating and enter in sleep mode.	YES																																
AP.39	Awakening level	+35%	0 to 100%	Set the resuming PID control level after a suspension period (sleep mode).	YES																																
AP.40	PID WakeUp mode	Below	Below Above Beyond	<div>Set PID wake-up mode, according to the following table:</div> <table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>Below</td><td>The PID operation starts when the frequency is lower than the value set in AP.39.</td></tr><tr><td>1</td><td>Above</td><td>The PID operation starts when the frequency is higher than the value set in AP.39.</td></tr><tr><td>2</td><td>Beyond</td><td>The PID operation starts when the difference between the reference value and the feedback variable is greater than the value set in (AP.39).</td></tr></table>	OPT.	DESCR.	FUNCTION	0	Below	The PID operation starts when the frequency is lower than the value set in AP.39.	1	Above	The PID operation starts when the frequency is higher than the value set in AP.39.	2	Beyond	The PID operation starts when the difference between the reference value and the feedback variable is greater than the value set in (AP.39).	YES																				
OPT.	DESCR.	FUNCTION																																			
0	Below	The PID operation starts when the frequency is lower than the value set in AP.39.																																			
1	Above	The PID operation starts when the frequency is higher than the value set in AP.39.																																			
2	Beyond	The PID operation starts when the difference between the reference value and the feedback variable is greater than the value set in (AP.39).																																			
AP.42	PID unit	0%	0 to 12	<div>Set PID controller unit, according to the following table:</div> <table><tr><th>OPT.</th><th>DESCR.</th><th>OPT.</th><th>DESCR.</th></tr><tr><td>0</td><td>%</td><td>7</td><td>V</td></tr><tr><td>1</td><td>Bar</td><td>8</td><td>l</td></tr><tr><td>2</td><td>mBar</td><td>9</td><td>kW</td></tr><tr><td>3</td><td>Pa</td><td>10</td><td>HP</td></tr><tr><td>4</td><td>kPa</td><td>11</td><td>°C</td></tr><tr><td>5</td><td>Hz</td><td>12</td><td>°F</td></tr><tr><td>6</td><td>rpm</td><td></td><td></td></tr></table>	OPT.	DESCR.	OPT.	DESCR.	0	%	7	V	1	Bar	8	l	2	mBar	9	kW	3	Pa	10	HP	4	kPa	11	°C	5	Hz	12	°F	6	rpm			YES
OPT.	DESCR.	OPT.	DESCR.																																		
0	%	7	V																																		
1	Bar	8	l																																		
2	mBar	9	kW																																		
3	Pa	10	HP																																		
4	kPa	11	°C																																		
5	Hz	12	°F																																		
6	rpm																																				
AP.43	PID unit gain	100.00%	0.00 to 300.00%	Allows setting the PID unit gain.	YES																																

Screen	Description	Default value	Range	Function	Set on RUN												
AP.44	PID scale unit	x1	0 to 4	<div>Adjusts the size to fit the unit selected at AP.21.</div> <table><tr><th>OPT.</th><th>DESCR.</th></tr><tr><td>0</td><td>x100</td></tr><tr><td>1</td><td>x10</td></tr><tr><td>2</td><td>x1</td></tr><tr><td>3</td><td>x0.1</td></tr><tr><td>4</td><td>x0.01</td></tr></table>	OPT.	DESCR.	0	x100	1	x10	2	x1	3	x0.1	4	x0.01	YES
OPT.	DESCR.																
0	x100																
1	x10																
2	x1																
3	x0.1																
4	x0.01																
AP.45	Proportional gain 2	100.00%	0.0 to 100.0%	Set the value of the proportional gain controller 2. This value should be increased whenever a greater control response is needed. Note: Increasing too much this value can cause a greater system instability.	NO												

The following figure shows the PID operation sleep mode setting details:




Group 9: Protections → Pr

Screen	Description	Default value	Range	Function	Set on RUN															
Pr.4	Load duty type	Heavy	NRML HEAVY	Select the load type.	NO															
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>NRML</td><td>Selects the normal load type (variable torque) for applications such as fans or pumps.</td></tr><tr><td>1</td><td>HEAVY</td><td>Selects the heavy load type (constant torque) for applications such as elevators and cranes.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	NRML	Selects the normal load type (variable torque) for applications such as fans or pumps.	1	HEAVY	Selects the heavy load type (constant torque) for applications such as elevators and cranes.						
				OPT.		DESCR.	FUNCTION													
				0		NRML	Selects the normal load type (variable torque) for applications such as fans or pumps.													
1	HEAVY	Selects the heavy load type (constant torque) for applications such as elevators and cranes.																		
Pr.5	Phase loss type	NONE	0 to 4	Select phase loss protection type.	NO															
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>NONE</td><td>Phase loss protection disabled.</td></tr><tr><td>1</td><td>OUTPUT</td><td>Output phase loss protection enabled.</td></tr><tr><td>2</td><td>INPUT</td><td>Input phase loss protection enabled. For its correct operation, the user should set the parameter Pr.6.</td></tr><tr><td>3</td><td>ALL</td><td>Input and output phase loss protection enabled. For its correct operation, set the parameter Pr.6.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	NONE	Phase loss protection disabled.	1	OUTPUT	Output phase loss protection enabled.	2	INPUT	Input phase loss protection enabled. For its correct operation, the user should set the parameter Pr.6.	3	ALL	Input and output phase loss protection enabled. For its correct operation, set the parameter Pr.6.
				OPT.		DESCR.	FUNCTION													
				0		NONE	Phase loss protection disabled.													
				1		OUTPUT	Output phase loss protection enabled.													
				2		INPUT	Input phase loss protection enabled. For its correct operation, the user should set the parameter Pr.6.													
3	ALL	Input and output phase loss protection enabled. For its correct operation, set the parameter Pr.6.																		
				 Caution: Users should ensure that disabling this protection does not compromise the operation of the installation and/or equipment.																


Screen	Description	Default value	Range	Function	Set on RUN
Pr.6	Ripple voltage	15V	1 to 100V	Set the DC Bus ripple voltage that must be exceeded to get a phase loss phase input fault when Pr.5 is set as "INPUT" or "ALL". This value is set following customer's requirements.	NO
Pr.7	Fault deceleration time	3.0s	0.0 to 600.0s	Deceleration time at fault trip.	YES
Pr.8	Start after restart	N	N S	Parameters Pr.9 and Pr.10 only operate when Pr.8 is set to 1(Yes).	YES
Pr.9	Retry attempts number	0	0 to 10	The number of attempts to try the auto restart is set at Pr.9.	YES
Pr.10 [33]	Retry delay	1.0s	0.0 to 60.0s	If a fault trip occurs during operation, the drive automatically restarts after the set time programmed at Pr.10. At each restart, the drive counts the number of tries and subtracts it from the number set at Pr.9 until the retry number count reaches 0. After an auto restart, if a fault trip does not occur within 60 secs, it will increase the restart count number. The maximum count number is limited by Pr.10.	YES


[33] Displayed when Pr.9 is higher than zero.

Screen	Description	Default value	Range	Function	Set on RUN																					
Pr.12	Response in case of a speed reference loss	None	0 to 5	Set the action to be taken if the drive loses a speed reference:	YES																					
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>None</td><td>Protection is disabled.</td></tr><tr><td>1</td><td>Free-Run</td><td>The drive cuts the output voltage and allows the motor free run.</td></tr><tr><td>2</td><td>Dec</td><td>The motor decelerates and then stops at the time set at Pr.7.</td></tr><tr><td>3</td><td>Hold Input</td><td>The drive will keep operating to the input value, mean value obtained from the last 10 seconds until the moment the reference loss has been detected.</td></tr><tr><td>4</td><td>Hold Output</td><td>The drive will keep operating to the input value, mean value obtained from the last 10 seconds until the moment the reference loss has been detected.</td></tr><tr><td>5</td><td>Lost Preset</td><td>The drive operates to the frequency defined in parameter Pr.14.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	None	Protection is disabled.	1	Free-Run	The drive cuts the output voltage and allows the motor free run.	2	Dec	The motor decelerates and then stops at the time set at Pr.7.	3	Hold Input	The drive will keep operating to the input value, mean value obtained from the last 10 seconds until the moment the reference loss has been detected.	4	Hold Output	The drive will keep operating to the input value, mean value obtained from the last 10 seconds until the moment the reference loss has been detected.	5	Lost Preset	The drive operates to the frequency defined in parameter Pr.14.
				OPT.		DESCR.	FUNCTION																			
				0		None	Protection is disabled.																			
				1		Free-Run	The drive cuts the output voltage and allows the motor free run.																			
				2		Dec	The motor decelerates and then stops at the time set at Pr.7.																			
				3		Hold Input	The drive will keep operating to the input value, mean value obtained from the last 10 seconds until the moment the reference loss has been detected.																			
				4		Hold Output	The drive will keep operating to the input value, mean value obtained from the last 10 seconds until the moment the reference loss has been detected.																			
5	Lost Preset	The drive operates to the frequency defined in parameter Pr.14.																								
 Caution: Users should ensure that disabling this protection does not compromise the operation of the equipment																										

Screen	Description	Default value	Range	Function	Set on RUN									
Pr.13 [34]	Lost reference delay	1.0s	0.1 to 120s	Delay time setting after which the speed reference loss protection will enable.	YES									
Pr.14 [34]	Reference for lost reference	0.00Hz	dr.19 to dr.20	In order to set the frequency value at which the drive will operate in case a speed reference loss occurs. Therefore, the parameter Pr.12 must be set to 'LostPreset'.	YES									
Pr.15 [34]	AI Lost Level	Half	Half Below	Analog input loss decision level.	YES									
Pr.17	Overload warning select	YES	NO YES	If the overload reaches the warning level, the terminal block multi-function output terminal and relay are used to output a warning signal. If 1 (Yes) is selected, it will operate. If 0 (No) is selected, it will not operate.	YES									
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>NO</td><td>Overload warning disabled.</td></tr><tr><td>1</td><td>YES</td><td>Overload warning enabled.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	NO	Overload warning disabled.	1	YES	Overload warning enabled.
				OPT.		DESCR.	FUNCTION							
				0		NO	Overload warning disabled.							
1	YES	Overload warning enabled.												
Pr.18	Overload warning level	+150%	30 to 180%	The overload warning is a combination of the parameters Pr.18-20. The drive will enable some of the digital outputs configured as 'OverLoad' whenever the current flowing within the motor is greater than the value defined in parameter Pr.18 during the time established in parameter Pr.19.	YES									
Pr.19	Overload warning time	10.0s	0.0 to 30.0s		YES									

[34] Displayed when Pr.12 is not set to None.

Screen	Description	Default value	Range	Function	Set on RUN												
Pr.20	Overload trip select	Giro	0 to 2	The drive will take the following actions in case an overload fault occurs:	YES												
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>None</td><td>Protection is disabled.</td></tr><tr><td>1</td><td>FreeRun</td><td>The drive's output is cut, having as a consequence the motor free run.</td></tr><tr><td>2</td><td>Dec</td><td>A deceleration until stop is produced in the time defined in parameter Pr.7.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	None	Protection is disabled.	1	FreeRun	The drive's output is cut, having as a consequence the motor free run.	2	Dec	A deceleration until stop is produced in the time defined in parameter Pr.7.
				OPT.		DESCR.	FUNCTION										
				0		None	Protection is disabled.										
				1		FreeRun	The drive's output is cut, having as a consequence the motor free run.										
2	Dec	A deceleration until stop is produced in the time defined in parameter Pr.7.															
 Caution: Users should ensure that disabling this protection does not compromise the operation of the installation and/or equipment.																	
Pr.21	Overload level	180%	30 to 200%	The overload warning protection is a combination of the parameters Pr.20-22.	YES												
Pr.22	Overload trip time	60.0s	0.0 to 60.0s	The drive will carry out the action selected in parameter Pr.20 whenever the current flow within the motor is greater than the parameter Pr.21 value during the time defined in parameter Pr.22.	YES												
Pr.25	Enable underload	NO	NO YES	Sets the underload warning options. Set to 1(Yes) and set the multi-function output terminals (OU.31 and OU.33) to 'Underload'. The warning signals are output when an underload condition arises.	YES												
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>NO</td><td>Underload warning disabled.</td></tr><tr><td>1</td><td>SI</td><td>Underload warning enabled.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	NO	Underload warning disabled.	1	SI	Underload warning enabled.			
				OPT.		DESCR.	FUNCTION										
				0		NO	Underload warning disabled.										
1	SI	Underload warning enabled.															
Pr.26	Underload warning delay	10.0s	0.0 to 600.0s	Set delay time when enabling the underload warning. The drive will wait this time before enabling the warning.	YES												

Screen	Description	Default value	Range	Function	Set on RUN												
Pr.27	Underload fault mode	None	0 to 2	Set the underload fault trip protection.	YES												
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>None</td><td>Protection is disabled.</td></tr><tr><td>1</td><td>Free-Run</td><td>Output is blocked in an underload fault trip situation.</td></tr><tr><td>2</td><td>Dec</td><td>The motor decelerates and stops.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	None	Protection is disabled.	1	Free-Run	Output is blocked in an underload fault trip situation.	2	Dec	The motor decelerates and stops.
				OPT.		DESCR.	FUNCTION										
				0		None	Protection is disabled.										
				1		Free-Run	Output is blocked in an underload fault trip situation.										
2	Dec	The motor decelerates and stops.															
Pr.28	Underload fault delay	30.0	0.0 to 600.0s	Set the delay time before triggering the underload fault.	YES												
Pr.29	Underload minimum level	+30%	10 to 30%	<ul style="list-style-type: none">Heavy Duty: Pr.29 is not supported. At Pr.30, underload level is decided based on the motor rated current.Normal Duty: At Pr.29 underload rate is decided based on twice the operation frequency of the motor rated slip speed (AP.12). At Pr.30, the underload rate is determined based on the frequency set at Cn.18. Upper and lower limits are based on the drive rated current	YES												
Pr.30	Underload maximum level	+30%	30 to 100%		YES												
Pr.31	Action in case no motor is detected	Nada	None Free-Run	The drive will carry out one of the following actions whenever a fault is present due to the fact that no motor has been connected to the drives output terminal:	YES												
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>None</td><td>Protection is disabled.</td></tr><tr><td>1</td><td>Free-Run</td><td>The drive's output is cut, having as a consequence the motor free run.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	None	Protection is disabled.	1	Free-Run	The drive's output is cut, having as a consequence the motor free run.			
				OPT.		DESCR.	FUNCTION										
0	None	Protection is disabled.															
1	Free-Run	The drive's output is cut, having as a consequence the motor free run.															
 Caution: Users should ensure that disabling this protection does not compromise the operation of the installation and/or equipment																	

Screen	Description	Default value	Range	Function	Set on RUN												
Pr.32	No motor fault level	+5%	1 to 100%	The fault protection if no motor is detected is a combination of parameters Pr.31-33. The drive will carry out the action set in parameter Pr.31 whenever the current flowing within the motor does not exceed the value defined in parameter Pr.32 during the time defined in parameter Pr.33.	YES												
Pr.33	No motor fault delay	3.0s	0.1 to 10.0s		YES												
Pr.40	Action in case of thermo-electronic fault	None	0 to 2	<p>The drive will carry out one of the following actions in case of a motor thermo-electronic fault:</p> <table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>None</td><td>The ETH function is not activated.</td></tr><tr><td>1</td><td>Free-Run</td><td>The drive output is blocked. The motor coasts to a halt (free-run).</td></tr><tr><td>2</td><td>Dec</td><td>The drive decelerates the motor until it stops.</td></tr></table>	OPT.	DESCR.	FUNCTION	0	None	The ETH function is not activated.	1	Free-Run	The drive output is blocked. The motor coasts to a halt (free-run).	2	Dec	The drive decelerates the motor until it stops.	YES
OPT.	DESCR.	FUNCTION															
0	None	The ETH function is not activated.															
1	Free-Run	The drive output is blocked. The motor coasts to a halt (free-run).															
2	Dec	The drive decelerates the motor until it stops.															
Pr.41	Motor cooling mode at zero speed	SELF	SELF FORCE D	<p>Select the drive mode of the cooling fan attached to the motor.</p> <table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>SELF</td><td>As the cooling fan is connected to the motor axis, the cooling effect varies based on motor speed. Most universal induction motors have this design.</td></tr><tr><td>1</td><td>FORCED</td><td>Additional power is supplied to operate the cooling fan. This provides extended operation at low speeds. Motors designed for drives typically have this design.</td></tr></table>	OPT.	DESCR.	FUNCTION	0	SELF	As the cooling fan is connected to the motor axis, the cooling effect varies based on motor speed. Most universal induction motors have this design.	1	FORCED	Additional power is supplied to operate the cooling fan. This provides extended operation at low speeds. Motors designed for drives typically have this design.	YES			
OPT.	DESCR.	FUNCTION															
0	SELF	As the cooling fan is connected to the motor axis, the cooling effect varies based on motor speed. Most universal induction motors have this design.															
1	FORCED	Additional power is supplied to operate the cooling fan. This provides extended operation at low speeds. Motors designed for drives typically have this design.															

Screen	Description	Default value	Range	Function	Set on RUN															
Pr.42	Overcurrent level during 1min	150%	120 to 200%	Set the current level which flows continuously during one minute in % referenced to the motor nominal current. The motor nominal current is set in parameter bA.13. Whenever this limit is over passed, the thermo-electronic protection will be enabled, and the action defined in parameter Pr.40 will be executed.	YES															
Pr.43	Continuous overcurrent level	+120%	50 to 150%	Set the overcurrent level under which the drive is able to work without enabling the thermo-electronic protection.	YES															
Pr.45	Free run trip mode	FreeRun	FreeRun Dec	Define trip mode in free run.	NO															
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>FreeRun</td><td>The drive cuts the output voltage and allows the motor free run.</td></tr><tr><td>1</td><td>Dec</td><td>The motor decelerates and then stops.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	FreeRun	The drive cuts the output voltage and allows the motor free run.	1	Dec	The motor decelerates and then stops.						
				OPT.		DESCR.	FUNCTION													
0	FreeRun	The drive cuts the output voltage and allows the motor free run.																		
1	Dec	The motor decelerates and then stops.																		
Pr.50	Stall prevention	00	00 to 11	Stall prevention can be configured for acceleration, deceleration, or while operating a motor at constant speed.	NO															
				<table><tr><th>OPC</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>00</td><td>Accelerating</td><td>Stall protection during acceleration.</td></tr><tr><td>01</td><td>At constant speed</td><td>Stall protection while operating at a constant speed.</td></tr><tr><td>10</td><td>At deceleration</td><td>Stall protection during deceleration.</td></tr><tr><td>11</td><td>FluxBraking</td><td>Flux braking during deceleration.</td></tr></table>		OPC	DESCR.	FUNCTION	00	Accelerating	Stall protection during acceleration.	01	At constant speed	Stall protection while operating at a constant speed.	10	At deceleration	Stall protection during deceleration.	11	FluxBraking	Flux braking during deceleration.
				OPC		DESCR.	FUNCTION													
				00		Accelerating	Stall protection during acceleration.													
				01		At constant speed	Stall protection while operating at a constant speed.													
10	At deceleration	Stall protection during deceleration.																		
11	FluxBraking	Flux braking during deceleration.																		

Screen	Description	Default value	Range	Function	Set on RUN
Pr.51	Speed for stall protection 1	60Hz	dr.19 to Pr.53 Hz	<p>Additional stall protection levels can be configured for different frequencies, based on the load type.</p> <p>The stall level can be set above the base frequency. The lower and upper limits are set using numbers that correspond in ascending order. For example, the range for Pr.54 becomes the lower limit for Pr.52 and the upper limit for Pr.56.</p>	YES
Pr.52	Level for stall protection 1	180%	30 to 250%		NO
Pr.53	Speed for stall protection 2	60Hz	In.55 to Pr.55 Hz		YES
Pr.54	Level for stall protection 2	180%	30 to 250%		NO
Pr.55	Speed for stall protection 3	60Hz	In.53 to Pr.57 Hz		YES
Pr.56	Level for stall protection 3	180%	30 to 250%		NO
Pr.57	Speed for stall protection 4	60Hz	In.55 to dr.20 Hz		YES
Pr.58	Level for stall protection 4	180%	30 to 250%		NO
Pr.59	Flux braking gain	0%	0 to 150%	Set flux braking gain.	YES
Pr.60	CAP diagnosis level	0%	10 to 100%	Set capacitors diagnosis percentage.	YES

Screen	Description	Default value	Range	Function	Set on RUN										
Pr.61 [35]	Capacitor diagnosis mode	+0%	0 to 3	This parameter allows performing a capacitor diagnosis To perform a capacitor diagnosis, the capacitance reference must be established by setting this parameter to 1 when the drive is used for the first time. The measured reference is saved in Pr. 63 and will be used as reference for the diagnosis.	NO										
				<table><tr><th>OPT.</th><th>DESCR.</th></tr><tr><td>0</td><td>Nonde</td></tr><tr><td>1</td><td>RefDiag (*)</td></tr><tr><td>2</td><td>PreDiag</td></tr><tr><td>3</td><td>InitDiag</td></tr></table>		OPT.	DESCR.	0	Nonde	1	RefDiag (*)	2	PreDiag	3	InitDiag
				OPT.		DESCR.									
				0		Nonde									
				1		RefDiag (*)									
				2		PreDiag									
3	InitDiag														
(*) Note: This option is used to set a capacitance reference. It is recommended to use it when the drive is operated for the first time.															
Pr.62 [35]	CAP exchange warning level	0% [36]	50.0 to 95.0%	Sets the capacitor exchange warning level. The warning "ECAP" will be displayed when this value is reached.	NO										
Pr.63 [35]	Capacitance reference	0.0% [36]	0.0 to 100.0%	This parameter shows the capacitance reference measured in Pr.61. This value must be equal to 100.0% when the drive is operated for the first time.	YES										
Pr.66	Braking resistor configuration	+0%	0 to 30%	Set braking resistor configuration (%ED: Duty cycle). Braking resistor configuration sets the rate at which the braking resistor operates for one operation cycle.	YES										
Pr.73	Speed deviation fault	N	N Y	Fault due to speed deviation.	YES										
Pr.74 [36]	Speed deviation band	50	1 to 20	Speed deviation band.	YES										
Pr.75 [36]	Speed deviation time	60	1 to 120	Speed deviation time.	YES										

[35] These parameters are displayed when Pr.60 is set to more than 0.

[36] Displayed when Pr.73 is set to YES.

Screen	Description	Default value	Range	Function	Set on RUN												
Pr.79	Action in case of fan trip	Trip	Trip Warn	Select the action to carry out in case a fault within the cooling fan is detected:	YES												
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>Trip</td><td>The drive generates a Fan-trip.</td></tr><tr><td>1</td><td>Warn</td><td>The drive will enable the relay configured as 'VentWarn'.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	Trip	The drive generates a Fan-trip.	1	Warn	The drive will enable the relay configured as 'VentWarn'.			
				OPT.		DESCR.	FUNCTION										
				0		Trip	The drive generates a Fan-trip.										
1	Warn	The drive will enable the relay configured as 'VentWarn'.															
Pr.80	Optional card trip mode	Giro	0 to 2	Enable an optional card fault (if any is used). Set the operation mode for the drive when a communication error occurs between the option card and the drive, or when the optional card is detached during operation.	YES												
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>None</td><td>No operation.</td></tr><tr><td>1</td><td>FreeRun</td><td>The drive output is blocked and fault trip information is shown on the display.</td></tr><tr><td>2</td><td>Dec</td><td>Motor decelerates to the value set at Pr.7.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	None	No operation.	1	FreeRun	The drive output is blocked and fault trip information is shown on the display.	2	Dec	Motor decelerates to the value set at Pr.7.
				OPT.		DESCR.	FUNCTION										
				0		None	No operation.										
1	FreeRun	The drive output is blocked and fault trip information is shown on the display.															
2	Dec	Motor decelerates to the value set at Pr.7.															
Pr.81	Low voltage trip delay	0.0s	0.0 to 60.0%	It allows setting a delay for low voltage fault.	NO												
Pr.82	Enable low voltage trip	NO	NO YES	When this parameter is set to NO and a low voltage situation occurs, the drive trips.	NO												
Pr.86	Fan use percentage	0%	0.0 to 100.0%	This parameter allows showing the accumulated percent of fan usage.	YES												
Pr.87	Fan exchange warning level	90.0%	0.0 to 100.0%	Set fan exchange warning level. When the value is reached, the EFAN warning appears.	YES												
Pr.88	Fan time reset	N	N Y	Sets the fan reset time.	NO												

Screen	Description	Default value	Range	Function			Set on RUN
Pr.89	CAP fan status	0	00 to 11	Shows the status of capacitor fans.			YES
				OPT.	DESCR.	FUNCTION	
				00	None	There are no warnings neither in the capacitors nor in fans.	
				01	CAP warning	There is a warning in the capacitor.	
				10	FAN warning	There is a warning in the fan.	
Pr.90	Warning information	-	-	Warning information.			-
Pr.91	Fifth fault	nOn	-	It stores information on the types of faults, the frequency, the current and the acceleration/deceleration condition at the time of fault. The latest fault is automatically stored in the 'Pr.95 ➔ First fault'.			-
Pr.92	Fourth fault	nOn	-				-
Pr.93	Third fault	nOn	-				-
Pr.94	Second fault	nOn	-				-
Pr.95	First fault	nOn	-				-
Pr.96	Reset fault history	0	0-1	It allows clearing the fault history stored from 'Pr.91' to 'Pr.95'.			YES

Group 10: Second Motor → M2

This group appears if any of In.65-71 is set to 26 (second motor). In the following table, data shaded in grey will be displayed when a related code has been selected.

Screen	Description	Default value	Range	Function	Set on RUN												
M2.4	Motor 2 acceleration ramp	20.0s	0.0 to 600.0s	Set the acceleration ramp for second motor adjustment. The established setting within the parameter is the time required to reach the maximum frequency value, starting from 0Hz.This ramp will be set according to the process necessities.	YES												
M2.5	Motor 2 deceleration ramp	30.0s	0.0 to 600.0s	Set the deceleration ramp for second motor adjustment. The established setting within the parameter is the time required to reach the maximum frequency value, starting from 0Hz.This ramp will be set according to the process necessities.	YES												
M2.6	Motor 2 rated power	4.0Kw	0.2 kW 0.4 kW ... 30.0 kW	Set the second motor rated power according to its nameplate.	NO												
M2.7	Motor 2 frequency	60.00Hz	30.00 to 400.00Hz	Set the second motor frequency to rated value according to its nameplate.	NO												
M2.8	Control type selection	V/Hz	0 to 4	Define the drive control type.	NO												
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>V/Hz</td><td>Scalar control mode. Drive carries out the control applying a voltage / frequency ramp to the motor.</td></tr><tr><td>2</td><td>Slip Com</td><td>Slip compensation mode. This mode reduces the effect of motor slip.</td></tr><tr><td>4</td><td>S-less1</td><td>Sensorless control mode.</td></tr></table>		OPT.	DESCR.	FUNCTION	0	V/Hz	Scalar control mode. Drive carries out the control applying a voltage / frequency ramp to the motor.	2	Slip Com	Slip compensation mode. This mode reduces the effect of motor slip.	4	S-less1	Sensorless control mode.
				OPT.		DESCR.	FUNCTION										
				0		V/Hz	Scalar control mode. Drive carries out the control applying a voltage / frequency ramp to the motor.										
2	Slip Com	Slip compensation mode. This mode reduces the effect of motor slip.															
4	S-less1	Sensorless control mode.															

Screen	Description	Default value	Range	Function	Set on RUN
M2.10	Poles number	(*)	2, 4, 6...48	Set the number of poles in the motor according to its nameplate.	NO
M2.11	Rated Slip	(*)	0 to 3000rpm	When facing a heavy load capable of producing a big slip during the start, configure this parameter to compensate the motor slip.	NO
M2.12	Motor nominal current	(*)	1.0 to 1000.0A	Set the motor nominal current in accordance with the nameplate.	NO
M2.13	No load current	(*)	0.5 to 1000.0A	Set the measured current at rated frequency without load. If any difficulties are found when measuring the current without load, this setting should be between 30% and 50% of the motor nameplate rated current.	NO
M2.14	Motor 2 voltage	(*)	170 to 480V	Set the motor rated voltage according to its nameplate.	NO
M2.15	Motor 2 efficiency	(*)	70 to 100%	Set the motor efficiency according to its nameplate.	NO
M2.16	Motor 2 inertia rate	(*)	0 to 8	Set the load inertia rate.	NO
M2.17	Stator resistor	(*)	(*)	Stator resistor fine setting.	NO
M2.18	Leak inductor	(*)	(*)	Leak inductor fine setting.	NO
M2.19	Stator inductor	(*)	(*)	Inductor stator fine setting.	NO
M2.20 [37]	Rotor time constant	228ms	25 to 5000ms	Rotor time constant fine setting.	NO

[37] Displayed when M2.8 is set to S-less.

(*) This value depends on the motor setting.

Screen	Description	Default value	Range	Function	Set on RUN		
M2.25	V/F pattern	Lineal	0 to 3	Set V/F pattern according to the following table.	NO		
				OPT.		DESCR.	FUNCTION
				0		Linear	Output voltage increases and decreases at constant rate proportional to voltage/frequency (V/F) relation
				1		Square	Output voltage increases quadratically according to the frequency. K=1.5.
				2		V/F User	Define a customized V/F pattern.
				3		Square2	Output voltage increases quadratically according to the frequency. K=2.
M2.26	Torque in forward direction	+2.0%	0.0 to 15.0%	Set the intensified torque in forward direction.	NO		
M2.27	Torque in reverse direction	+2.0%	0.0 to 15.0%	Set the intensified torque in reverse direction.	NO		
M2.28	Stall prevention level motor 2	150%	30 to 150%	Set the stall prevention level.	NO		
M2.29	Motor 2 overcurrent level during 1 minute	+150%	100 to 200%	Set the current level which flows continuously during one minute in % referenced to the motor nominal current. The motor nominal current is set in parameter M2.12. Whenever this limit is over passed, the thermo-electronic protection will be enabled, and the action defined in parameter Pr.40 will be executed.	NO		
M2.30	Motor 2 continuous overcurrent level	+100%	50 to 150%	Set the overcurrent level under which the drive is able to work without enabling the thermo-electronic protection.	NO		

Group 11: PLC Sequence → US

This group appears when AP.2 is set to 1 (NO) or CM.95 is set to 2 (P2P Master).

A PLC sequence creates a simple sequence from a combination of different function blocks. The sequence can comprise of a maximum of 18 steps using 29 function blocks and 30 parameters.

One loop refers to a single execution of a user configured sequence that contains a maximum of 18 steps. Users can select a Loop Time of between 10-1000ms.

The parameters for configuring PLC sequences configuration can be found in groups 11 and 12 of the removable display; which are equivalent to groups US (for user sequence settings) and UF (for function block settings).

Screen	Description	Default value	Range	Function			Set on RUN
US.1	PLC operation mode	Stop	0 a 2	This parameter allows setting the run and stop sequences.			NO
				OPT.	DESCR.	FUNCTION	
				0	Stop	Stop PLC sequence.	
				1	Run	The sequence will run continuously with the loop time set in US.2.	
				2	Run DI	The sequence will run continuously with the loop time set in US.2 while the digital input set as 50 "PLC" is active.	
US.2	PLC loop time	0.02s	0.01s 0.02s 0.05s 0.1s 0.5s 1s	Set the PLC sequence loop time.			NO

Screen	Description	Default value	Range	Function	Set on RUN
US.11	Output link address for PLC function 1	0	0 to 65535	Use registers US.11-28 to set the parameters to connect the 18 function blocks. If the input value is 0, an output value cannot be used.	NO
US.12	Output link address for PLC function 2	0		To use the output value in step 1 for the frequency reference (Cmd Frequency), enter the communication address (0x1101) of the Cmd frequency as the Link UserOut1 parameter.	NO
...					
US.27	Output link addr. PLC function 17	0	0 to 65535	See US.11.	NO
US.28	Output link addr. PLC function 18	0			NO
US.31	PLC input value 1	0	-9999 to 9999	Use registers US.31-60 to set 30 void parameters. Use when constant (Const) parameter input is needed in the user function block.	NO
US.32	PLC input value 2	0			NO
...					
US.60	PLC input value 30	0	-9999 to 9999	See US.31.	NO
US.80	Analogue input V1 value	0.000	0 to 12.000%	Allows setting the analog input V1 voltage value.	NO
US.81	Analogue input I2 value	+0.000	-12.000 to 12.000%	Allows setting the analog input I2 voltage or current values.	NO
US.82	Digital inputs value	0	0 to 127	Allows setting the digital inputs voltage value.	NO
US.85	Analogue output value	0	0.000 to 10.000%	Allows setting the analog output AO voltage or current values.	NO
US.88	Digital output value	0	0 to 3	Allows setting the digital output Q1 voltage value.	NO

Group 12: PLC Function → UF

This group appears when AP.2 is set to 1 (Yes) or CM.95 is set to 2 (P2P Master).

Set user defined functions for the 18 function blocks. If the function block setting is invalid, the output of the User Output is -1. All outputs are read only, and can be used with the user output link of the US group.

Screen	Description	Default value	Range	Function	Set on RUN																																	
UF.1	PLC function 1	NOP	0 to 28	Choose the function to perform in the function block, according to the following table:	NO																																	
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>0</td><td>NOP</td><td>No operation</td></tr><tr><td>1</td><td>ADD</td><td>Addition, (A + B) + C</td></tr><tr><td>2</td><td>SUB</td><td>Subtraction, (A – B) – C</td></tr><tr><td>3</td><td>ADD SUB</td><td>Addition and subtraction compound, (A + B) – C</td></tr><tr><td>4</td><td>MIN</td><td>Smallest value of the input values, MIN(A, B, C).</td></tr><tr><td>5</td><td>MAX</td><td>Largest value of the input values, MAX(A, B, C).</td></tr><tr><td>6</td><td>ABS</td><td>Absolute value of the A parameter, A </td></tr><tr><td>7</td><td>NEGATE</td><td>Negative value of the A parameter, -(A).</td></tr><tr><td>8</td><td>MPYDIV</td><td>Compound multiplication and division, (A x B)/C.</td></tr><tr><td>9</td><td>REMAINDE</td><td>Remainder operation of A and B, A % B</td></tr></table>		OPT.	DESCR.	FUNCTION	0	NOP	No operation	1	ADD	Addition, (A + B) + C	2	SUB	Subtraction, (A – B) – C	3	ADD SUB	Addition and subtraction compound, (A + B) – C	4	MIN	Smallest value of the input values, MIN(A, B, C).	5	MAX	Largest value of the input values, MAX(A, B, C).	6	ABS	Absolute value of the A parameter, A	7	NEGATE	Negative value of the A parameter, -(A).	8	MPYDIV	Compound multiplication and division, (A x B)/C.	9	REMAINDE	Remainder operation of A and B, A % B
				OPT.		DESCR.	FUNCTION																															
				0		NOP	No operation																															
				1		ADD	Addition, (A + B) + C																															
				2		SUB	Subtraction, (A – B) – C																															
				3		ADD SUB	Addition and subtraction compound, (A + B) – C																															
				4		MIN	Smallest value of the input values, MIN(A, B, C).																															
				5		MAX	Largest value of the input values, MAX(A, B, C).																															
				6		ABS	Absolute value of the A parameter, A																															
				7		NEGATE	Negative value of the A parameter, -(A).																															
				8		MPYDIV	Compound multiplication and division, (A x B)/C.																															
				9		REMAINDE	Remainder operation of A and B, A % B																															
Note: Continues on the next page																																						

Screen	Description	Default value	Range	Function	Set on RUN															
				Note: Comes from the previous page.																
				<table><tr><th>OPT.</th><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>10</td><td>COMPARE - GT</td><td>Comparison operation: if (A > B) the output is C; if (A <=B) the output is 0. If C is not configured (default value 0x0000), the output when the condition is satisfied is 1.</td></tr><tr><td>11</td><td>COMPARE - GEQ</td><td>Comparison operation; if (A >= B) output is C; if (A<B) the output is 0. If C is not configured (default value 0x0000), the output when the condition is satisfied is 1.</td></tr><tr><td>12</td><td>COMPARE -EQUAL</td><td>Comparison operation, if (A == B) then the output is C. Otherwise, the output is 0. If C is not configured (default value 0x0000), the output when the condition is satisfied is 1.</td></tr><tr><td>13</td><td>COMPARE -NEQUAL</td><td>Comparison operation, if (A!= B) then the output is C. Otherwise, the output is 0. If C is not configured (default value 0x0000), the output when the condition is satisfied is 1.</td></tr></table>	OPT.	DESCR.	FUNCTION	10	COMPARE - GT	Comparison operation: if (A > B) the output is C; if (A <=B) the output is 0. If C is not configured (default value 0x0000), the output when the condition is satisfied is 1.	11	COMPARE - GEQ	Comparison operation; if (A >= B) output is C; if (A<B) the output is 0. If C is not configured (default value 0x0000), the output when the condition is satisfied is 1.	12	COMPARE -EQUAL	Comparison operation, if (A == B) then the output is C. Otherwise, the output is 0. If C is not configured (default value 0x0000), the output when the condition is satisfied is 1.	13	COMPARE -NEQUAL	Comparison operation, if (A!= B) then the output is C. Otherwise, the output is 0. If C is not configured (default value 0x0000), the output when the condition is satisfied is 1.	
OPT.	DESCR.	FUNCTION																		
10	COMPARE - GT	Comparison operation: if (A > B) the output is C; if (A <=B) the output is 0. If C is not configured (default value 0x0000), the output when the condition is satisfied is 1.																		
11	COMPARE - GEQ	Comparison operation; if (A >= B) output is C; if (A<B) the output is 0. If C is not configured (default value 0x0000), the output when the condition is satisfied is 1.																		
12	COMPARE -EQUAL	Comparison operation, if (A == B) then the output is C. Otherwise, the output is 0. If C is not configured (default value 0x0000), the output when the condition is satisfied is 1.																		
13	COMPARE -NEQUAL	Comparison operation, if (A!= B) then the output is C. Otherwise, the output is 0. If C is not configured (default value 0x0000), the output when the condition is satisfied is 1.																		
				Note: Continues on the next page.																

Screen	Description	Default value	Range	Function	Set on RUN																		
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Screen	Description	Default value	Range	Function	Set on RUN
UF.2	Input A for PLC function 1	0	0 to 65535	Communication address of the first input parameter of the PLC function.	NO
UF.3	Input B for PLC function 1	0	0 to 65535	Communication address of the second input parameter of the PLC function.	NO
UF.4	Input C for PLC function 1	0	0 to 65535	Communication address of the third input parameter of the PLC function.	NO
UF.5	Output PLC function 1	+0	-32767 to 32767	Output value (Read Only) after performing the function block.	NO
UF.6	PLC function 2	NOP	See UF.1	See UF.1.	NO
UF.7	Input A for PLC function 2	0	See UF.2	See UF.2.	NO
UF.8	Input B for PLC function 2	0	See UF.3	See UF.3.	NO
UF.9	Input C for PLC function 2	0	See UF.4	See UF.4.	NO
UF.10	Output PLC function 2	+0	See UF.5	See UF.5.	NO
...					
UF.86	PLC function 18	NOP	See UF.1	See UF.1.	NO
UF.87	Input A for PLC function 18	0	See UF.2	See UF.2.	NO
UF.88	Input B for PLC function 18	0	See UF.3	See UF.3.	NO
UF.89	Input C for PLC function 18	0	See UF.4	See UF.4.	NO
UF.90	Output PLC function 18	+0	See UF.5	See UF.5.	NO

MODBUS COMMUNICATION

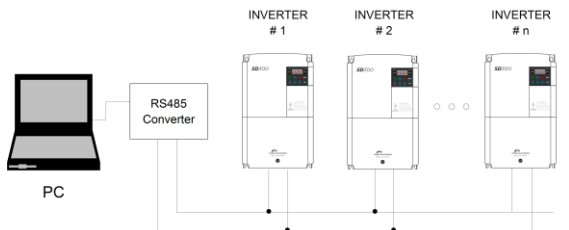
15

To control the variable speed drive with a PLC or a computer, the industrial standard communications protocol of Modicon, Modbus, is used. Connect the communication cables ^[1] and set the communication parameters on the drive according to the guidelines within this section.

Introduction

Various drives, or other slave devices, can be connected in a RS485 network to be controlled by a PLC or computer. This way, parameter setting and monitoring can be done from a computer, via a user program.

To communicate, any kind of RS485 converter can be used. Specifications depend on the manufacturer.



SD30ITR0001AI

RS485 network system configuration

[1] For detailed instructions on how to make the connections, please contact Power Electronics.

The purpose of the Serial Communication Network of the SD300 is to integrate the drive into a network compatible with the Modbus communications protocol. This is possible using the RS485 physical communications port or USB port.

Modbus communication system allows SD300 drives to be controlled and/or monitored as a slave by a Modbus master from a remote location.

RS485 network allows connecting up to 16 equipment in the same network.

SD300 drives operate as a peripheral slave when connected to Modbus system. This means that the drive does not start the communication task, the master does.

Practically all of the operating modes, parameters and drive characteristics are accessible through serial communications. For example, master can give start and stop order to the drive, control SD300 status, read the current used by the motor etc., in short, the master can access all of the features of the drive.

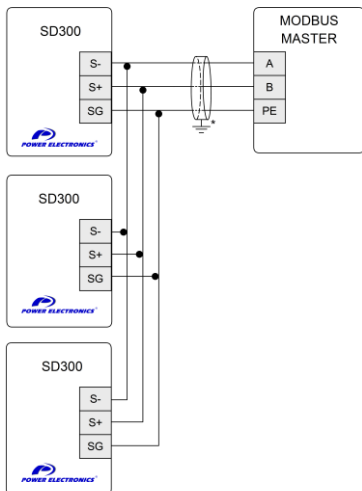
Communication Standards

ITEM	STANDARD
Communication method/ Transmission type	RS-485/Bus type, Multi-drop Link System
Number of connected inverters/ Transmission distance	Maximum of 16 inverters / Maximum 1,200m (recommended distance: within 700m)
Recommended cable size	0.75mm ² , (18AWG), Shielded Type Twisted-Pair (STP) Wire
Installation type	Dedicated terminals (S+/S-/SG) on the control terminal block
Power supply	Supplied by the inverter - insulated power source from the inverter internal circuit
Communication speed	1200/2400/9600/19200/38400/57600/115200 bps
Control procedure	Asynchronous communications system
Communication system	Half duplex system

ITEM	STANDARD
Character system	Modbus-RTU: Binary / PE Bus: ASCII
Stop bit length	1-bit/2-bit
Frame error check	2 bytes
Parity check	None/Even/Odd
Terminals	S- → RS485 A (negative) S+ → RS485 B (positive) SG → RS Common (0VDC)
Output signal level	'1' logical = +5V differential '0' logical = -5V differential
Input signal level	'1' logical = +5V differential '0' logical = -5V differential
Programmable inputs via Modbus	7 digital inputs in IP20 drives and 5 digital inputs in IP66 drives 2 programmable analogue inputs (0~10V / 4~20mA)
Programmable outputs via Modbus	1 relay output; 1 pulse output (TO) in IP20 drives. 1 programmable analogue outputs (0~10 V / 0~32 mA) 1 digital output

RS485 Connections

The following diagram shows a common wiring for a RS485 connection:



* The connection of the shield could be done on the gateway terminals or on the opposite extreme of the cable, depending on the installation conditions.

SD30DTR0001A1

RS485 connection

Supported Modbus Function Codes

Serial communications protocol provided by SD300 drive adhere to Modbus. The drive uses four reading and writing functions from all of the functions that exist in Modbus protocol. These are:

Function	Description
3	Registers Reading
4	Read Input Register
6	Write Single Register
16	Registers Writing

The implementation of these function codes allows reading up to 120 registers from a Parameter Group using a single frame. If you want to access to a consecutive memory registers, but belonging to different groups, you should access in as many frames as groups are involved.

Modbus Function Code N° 3: Registers Reading

This function code allows the Modbus controller (master) to read the content of the data registers indicated in the drive (slave). This function code only admits unicast addressing. Broadcast or groupcast addressing are not possible with this function code.

The implementation of this function code in the drive allows reading up to 120 registers with consecutive addresses of the drive in a single frame.

Next, a frame is shown where the master tries to read the content of 3 registers of a drive where the current used by each phase is. The information that should be attached in the ask frame is the following:

- Data address of the drive.
- Modbus function code (3 Registers reading).
- Starting Data address.
- Registers number for reading.
- CRC-16 code.

The answer of the drive (slave) should contain the following fields:

- Data address of the slave.
- Modbus function code (3 Registers reading).
- Bytes number for reading.
- Bytes number / 2 registers.
- CRC-16 code.

Each register consists of 2 bytes ($2 \times 8 \text{ bits} = 16 \text{ bits}$). This is the default length for all registers.

Example:

Suppose that we want to read the motor current (nameplate data) via communications. This data corresponds to the parameter G2.13 'MTR CUR=0.0A'. The frame that should be transmitted is:

Modbus Address	Modbus Function Code	Starting Data Address (44622)	Registers Number	CRC-16
0x0A	0x03	0x0120D	0x0001	0x2493

Suppose that instantaneous current of the equipment is 8.2 A. (Modbus value 82 decimal = 0x52 Hexadecimal). The answer of the slave will be:

Modbus Address	Modbus Function Code	Bytes Number	Data (address 20) (=110)	CRC-16
0x0A	0x03	0x02	0x0052	0x9C78

Modbus Function Code N° 16: Registers Writing

This function code allows the Modbus controller (master) to write the content of the data registers indicated in the drive (slave). whenever those registers are not of Read only. Registers writing by the master does not impede the later modification of those registers by the slave.

The implementation of this function code in the drive allows writing up to 5 registers of the drive in a single frame.

Next is shown a frame where the master tries to write the content of 1 register that stores the acceleration time. The information that should be sent in the request frame is the following:

- Data address of the slave.
- Modbus function code (16 Registers writing).
- Starting Data Address.
- Registers number for writing.
- Bytes number for writing.
- Content of registers for writing.
- CRC-16 code.

The answer of the slaves includes:

- Data address of the slave.
- Modbus function code (16 Registers writing).
- Starting Data Address.
- Written registers number.
- CRC-16 code.

Addressing Modes

Broadcast Addressing Mode

Broadcast addressing mode allows the master to access at the same time to all of the slaves connected to the Modbus network. The Modbus function code that admits this global addressing mode is:

Function	Description
16	Registers Writing

In order to access to all of the equipment connected in a Modbus network. you must use the address 0.

When this address is used. all of the slaves in the Modbus network make the required task but they do not prepare any answer.

Summary of Modbus Addresses

Common Area

Modbus Address		Parameter	Scale	Units	R/W	Data Values
Decimal	Hexadecimal					
40000	0h0000	Inverter Model	-	-	R	B: SD300
40001	0h0001	Drive Power Rating	-	-	R	0: 0.75kW 1: 1.5kW 2: 2.2kW 3: 3.7kW 4: 5.5kW 5: 7.5kW 6: 11kW 7: 15kW 8: 18.5kW 9: 22kW
40002	0h0002	Drive Input Voltage	-	-	R	0: 220VAC 1: 400VAC
40003	0h0003	SW Version	-	-	R	(Ex) 0x0100: Version 1.0 (Ex) 0x0101: Version 1.1
40005	0h0005	Reference Frequency	0.01	Hz	R/W	Starting Frequency to Max Frequency
40006	0h0006	Start / Stop Command	-	-	R/W	Bit 0: Stop
						Bit 1: Forward Start
						Bit 2: Reverse Start
						Bit 3: Fault Reset
						Bit 4: Emergency Stop
					-	Bit 5: Not used
					R	Bit 6 – 8: Setpoint Introduction 0: Local 1: Start/Stop-1 2: Start/Stop-2 3: RS485 integrated 4: Communications Option 5: PLC Option

Modbus Address		Parameter	Scale	Units	R/W	Data Values
Decimal	Hexadecimal					
						Bit 9 – 14: Reference Frequency 0: Local Reference 1: Not used 2: Step frequency 1 3: Step frequency 2 4: Step frequency 3 5: Step frequency 4 6: Step frequency 5 7: Step frequency 6 8: Step frequency 7 9: Step frequency 8 10: Step frequency 9 11: Step frequency 10 12: Step frequency 11 13: Step frequency 12 14: Step frequency 13 15: Step frequency 14 16: Step frequency 15 17: Up Speed 18: Down Speed 19: Constant 20 – 21: Reserved 22: Analog V1 23: Analog I1 24: Analog V2 25: Analog I2 26: Reserved 27: RS485 28: Communication Option 29: PLC Option 30: Fix Frequency 31: PID Bit 15: Not used
40007	0h0007	Acceleration Time	0.1	Sec	R/W	-
40008	0h0008	Deceleration Time	0.1	Sec	R/W	-
40009	0h0009	Output Current	0.1	A	R	-
40010	0h000A	Output Frequency	0.01	Hz	R	-
40011	0h000B	Output Voltage	1	V	R	-
40012	0h000C	DC Bus Voltage	1	V	R	-
40013	0h000D	Output Power	0.1	kW	R	-

Modbus Address		Parameter	Scale	Units	R/W	Data Values
Decimal	Hexadecimal					
40014	0h000E	Drive Status	-	-	R	Bit 0: Stop
						Bit 1: Start (+)
						Bit 2: Start (-)
						Bit 3: Fault
						Bit 4: Accelerating
						Bit 5: Decelerating
						Bit 6: Steady Status
						Bit 7: DC Brake
						Bit 8: Stop
						Bit 9: Fix Frequency
						Bit 10: Open Brake
						Bit 11: Start (+) Command
						Bit 12: Start (-) Command
						Bit 13: Start / Stop by Communication
						Bit 14: Freq. Reference by Communication
						Bit 15: 0-Remote; 1-Local
40015	0h000F	Fault information	-	-	R	Bit 0: Latch type fault
						Bit 3: Level type fault
						Bit 10: Hardware diagnosis
40016	0h0010	Digital Inputs Status	-	-	R	Bit 0: P1
						Bit 1: P2
						Bit 2: P3
						Bit 3: P4
						Bit 4: P5
						Bit 5: P6
						Bit 6: P7
40017	0h0011	Digital Outputs Status	-	-	R	Bit 7: P8
						Bit 0: Relay 1
40018	0h0012	V1	0.1	%	R	Bit 1: Multifunction output
40019	0h0013	V2	0.1	%	R	Voltage input V1
40020	0h0014	I2	0.1	%	R	Voltage Input V2 (Option I/O)
40021	0h0015	RPM	1	rpm	R	Current Input I2
40026	0h001A	Display unit	-	-	R	Speed Output
40027	0h001B	Number of poles	-	-	R	0: Hz
						1: rpm
						Motor poles visualization

Notes:

- Start / Stop order through communications (address 40006/0h0006)

Every bit is enabled when they change their status from 0 to 1. For example, the drive stops due to a fault during start. Until the fault has been reset and the start order is given, the drive will not operate.

- Addresses 40005/0h0005 and 40006/0h0006

The values stored in these addresses will be deleted if the drive loses its power supply. These addresses will only keep their values while the equipment remains powered.

Monitoring Parameters

NOTE: These are read-only parameters.

Modbus Address		Parameter	Scale	Units	Values
Decimal	Hexadecimal				
40768	0h0300	Drive model	-	-	SD300: 006h
40769	0h0301	Rated power	-	-	0.75kW: 3200h 1.5 kW: 4015h 2.2 kW: 4022h 3.7 kW: 4037h 5.5 kW: 4055h 7.5 kW: 4075h 11 kW: 40B0h 15 kW: 40F0h 18.5 kW: 4125h 22 kW: 4160h
40770	0h0302	Input voltage	-	-	220VAC: 0221h 400VAC: 0431h
40771	0h0303	SW Version	-	-	(Ex) 0x0100: Version 1.0 (Ex) 0x0101: Version 1.1
40773	0h0305	Drive operation state	-	-	Bit 0 – 3: 0: Stopped 1: Operating in forward direction 2: Operating in reverse direction 3: DC operating (0 speed control) Bit 4 – 7 1: Speed searching 2: Accelerating 3: Operating at constant rate 4: Decelerating 5: Decelerating to stop 6: H/W OCS 7: S/W OCS 8: Dwell operation Bit 12 – 15 0: Normal state 4: A warning has occurred 8: A fault has occurred. Drive will operate according to the setting of Pr.30.

Modbus Address		Parameter	Scale	Units	Values
Decimal	Hexadecimal				
40774	0h0306	Drive operation frequency command source	-	-	Bit 0 – 7: Frequency command source 0: Keypad speed 1: Keypad torque 2-4: Up/Down operation speed 5: V1, 7: V2, 8: I2, 9: Pulse 10: Built-in RS 485 11: Optional communication card 12: PLC 13: Jog 14: PID 25-39: Multi-step speed frequency Bit 8-15: Operation command source 0: Keypad 1: Optional communication card 2: PLC 3: Built-in RS 485 4: Terminal block
40775	0h0307	SW Version	-	-	(Ex) 0x0100: Version 1.0
40776	0h0308	SW Version	-	-	(Ex) 0x0101: Version 1.1
40784	0h0310	Output current	0.1	A	-
40785	0h0311	Output frequency	0.01	Hz	-
40786	0h0312	Output rpm	0	rpm	-
40787	0h0313	Motor speed feedback	0	rpm	-32768 rpm – 32767 rpm (directional)
40788	0h0314	Output voltage	1	V	-
40789	0h0315	DC bus voltage	1	V	-
40790	0h0316	Output power	0.1	kW	-
40791	0h0317	Output torque	0.1	%	-
40792	0h0318	PID reference	0.1	%	-
40793	0h0319	PID feedback	0.1	%	-
40794	0h031A	Motor 1 poles number	-	-	Visualization of motor 1 poles
40795	0h031B	Motor 2 poles number	-	-	Visualization of motor 2 poles
40796	0h031C	Poles number of the selected motor	-	-	Visualization of selected motor poles
40797	0h031D	Select Hz/rpm	-	-	0: Hz, 1: rpm
40800	0h0320				Bit 0: P1

Modbus Address		Parameter	Scale	Units	Values
Decimal	Hexadecimal				
		Digital inputs information			Bit 1: P2 Bit 2: P3 Bit 3: P4 Bit 4: P5 Bit 5: P6 Bit 6: P7
40801	0h0321	Digital outputs information	-	-	Bit 0: Relay 1 Bit 1: Multi-function output
40802	0h0322	Communication addresses information	-	-	Bit 0: Input 1 (CM.70) Bit 1: Input 2 (CM.71) Bit 2: Input 3 (CM.72) Bit 3: Input 4 (CM.73) Bit 4: Input 5 (CM.74) Bit 5: Input 6 (CM.75) Bit 6: Input 7 (CM.76) Bit 7: Input 8 (CM.77)
40803	0h0323	Selected motor	-	-	0: Motor 1 1: Motor 2
40804	0h0324	V1	0.01	%	Analog voltage input V1
40805	0h0325	V2	0.01	%	Analog voltage input V2
40806	0h0326	I2	0.01	%	Analog current input I2
40807	0h0327	AO1	0.01	%	Analog output 1
40808	0h0328	AO2	0.01	%	Analog output 2
40813	0h032D	Drive temperature	1	°C	-
40814	0h032E	Drive power	1	kWh	-
40815	0h032F	consumption	1	kWh	-
40816	0h0330	Latch type trip 1 information	-	-	Bit 0: Overload Bit 1: Underload Bit 2: Inverter Overload Bit 3: E-Thermal Bit 4: Ground Fault Bit 5: Output open-phase Bit 6: Input open-phase Bit 9: NTC Bit 10: Overcurrent Bit 11: Overvoltage Bit 12: External trip Bit 13: Arm short Bit 14: Over Heat Bit 15: Open fuse

Modbus Address		Parameter	Scale	Units	Values
Decimal	Hexadecimal				
40817	0h0331	Latch type trip 2 information	-	-	Bit 0: MC Fail trip
					Bit 2: PTC trip
					Bit 3: Fan trip
					Bit 5: Error while writing parameter
					Bit 6: Pre PID trip
					Bit 7: External card contact fault
					Bit 8: External brake trip
					Bit 9: No motor trip
					Bit 10: External card fault
40818	0h0332	Level type trip information	-	-	Bit 0: Free run fault
					Bit 1: Low voltage
					Bit 2: Lost command
					Bit 3: Display lost command
					Bit 4: Safety A
					Bit 5: Safety B
40819	0h0333	HW diagnosis trip information	-	-	Bit 0: ADC error
					Bit 1: EEPROM error
					Bit 2: Watchdog1
					Bit 3: Watchdog 2
					Bit 5: Full queue
40820	0h0334	Warning information	-	-	Bit 0: Overload
					Bit 1: Underload
					Bit 2: Drive overload
					Bit 3: Lost command
					Bit 4: Fan running
					Bit 5: DB
					Bit 6: Wrong encoder installation
					Bit 7: Encoder disconnection
					Bit 8: Keypad lost
					Bit 9: Auto tuning failed
40832	0h0340	Days ON	0	Days	Total number of days the drive has been powered on.
40833	0h0341	Minutes ON	0	Minutes	Total number of minutes the drive has been powered on, excluding the total number of days.
40834	0h0342	Days on run	0	Days	Total number of days the drive has been driving the motor.

Modbus Address		Parameter	Scale	Units	Values
Decimal	Hexadecimal				
Modbus Address		Parameter	Scale	Units	Values
Decimal	Hexadecimal				
40835	0h0343	Minutes on run	0	Minutes	Total number of minutes the drive has been driving the motor, excluding the total number of days.
40836	0h0344	Fan runtime days	0	Days	Total number of days the heat sink fan has been running.
40837	0h0345	Fan runtime minutes	0	Minutes	Total number of minutes the heat sink fan has been running, excluding the total number of days.
40842	0h034A	Optional card	-	-	0: None 9: CANopen

Control Parameters

NOTE: These parameters are read and write.

Modbus Address		Parameter	Scale	Units	Values
Decimal	Hexadecimal				
40896	0h0380	Frequency command	0.01	Hz	Frequency command setting
40897	0h0381	Rpm command	1	rpm	Rpm command setting
40898	0h0382	Operation command	-	-	Bit 0 0: Stop command 1: Run command Bit 1 0: Reverse command 1: Forward command Bit 2: 0 → 1: Trip initialization Bit 3: 0 → 1: Free-run stop
40899	0h0383	Acceleration time	0.1	s	Acceleration time setting
40900	0h0384	Deceleration time	0.1	s	Deceleration time setting
40901	0h0385	Communications addresses control (0: Off, 1: On)			Bit 0: Input 1 (CM.70) Bit 1: Input 2 (CM.71) Bit 2: Input 3 (CM.72) Bit 3: Input 4 (CM.73) Bit 4: Input 5 (CM.74) Bit 5: Input 6 (CM.75) Bit 6: Input 7 (CM.76) Bit 7: Input 8 (CM.77)
40902	0h0386	Digital outputs control (0: Off, 1: On)			Bit 0: Relay 1 Bit 1: Multi-function output
40904	0h0388	PID reference	0.1	%	PID reference command
40905	0h0389	PID feedback	0.1	%	PID feedback value
40906	0h038A	Motor rated current	0.1	A	-
40907	0h038B	Motor rated voltage	1	V	-
40912	0h0390	Torque reference	0.1	%	Torque command
40913	0h0391	Torque limit positive forward	0.1	%	Torque limit in forward direction
40914	0h0392	Torque limit negative forward	0.1	%	Regenerative torque limit in forward direction
40915	0h0393	Torque limit positive reverse	0.1	%	Torque limit in reverse direction

Modbus Address		Parameter	Scale	Units	Values
Decimal	Hexadecimal				
40916	0h0394	Torque limit negative reverse	0.1	%	Regenerative torque limit in reverse direction
40917	0h0395	Torque bias	0.1	%	Torque bias

Memory Control Area

NOTE: These parameters are read and write.

Modbus Address		Parameter	Scale	Units	Set on run	Function
Decimal	Hexadecimal					
40992	0h03E0	Save parameters	-	-	YES	0: No, 1: YES
40993	0h03E1	Monitor mode initialization	-	-	NO	0: No, 1: YES
40994	0h03E2	Initialize parameters	-	-	YES	0: No, 1: All. By groups: 2: Operation, 3: bA, 4: Ad, 5: Cn, 6: In, 7: OU, 8: CM, 9: AP, 12: Pr, 13: M2. Note: Setting is prohibited during fault trip interruptions.
40995	0h03E3	Display changed parameters	-	-	NO	0: No, 1: YES
40997	0h03E5	Delete fault history	-	-	NO	0: No, 1: YES
40998	0h03E6	Delete user registered codes	-	-	NO	0: No, 1: YES
40999	0h03E7	Hide parameter mode	0	Hex	NO	Write: 0-9999
						Read: 0: Unlock, 1: Lock
41000	0h03E8	Lock parameter mode	0	Hex	NO	Write: 0-9999
						Read: 0: Unlock, 1: Lock
41001	0h03E9	Easy parameter setup	-	-	NO	0: No, 1: YES
41002	0h03EA	Initialize power consumption	-	-	NO	0: No, 1: YES
41003	0h03EB	Initialize operation accumulative time	-	-	NO	0: No, 1: YES
41004	0h03EC	Initialize fan operation accumulative time	-	-	NO	0: No, 1: YES

Programming Parameters

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
0.00	Local speed	44353	0h1101	dr.19 to dr.20	dr.19 to dr.20
dr.2	Local torque	44354	0h1102	-180.0 to 180.0%	-1800 to 1800
ACC	Acceleration Ramp	44355	0h1103	0.0 to 600.0s	0 to 6000
dEC	Deceleration Ramp	44356	0h1104	0.0 to 600.0s	0 to 6000
drv	Control mode 1	44358	0h1106	LOCAL	0
				REMOTE	1
				REMOTE2	3
				MODBUS	4
				COMMS	5
				PLC	6
Frq	Speed reference 1	44359	0h1107	LOCAL	0
				V1	2
				V2	4
				I2	5
				MDBUS	6
				COMMS	8
dr.8	Torque reference 1	44360	0h1108	PLC	9
				PULSE	12
				LOCAL	0
				V1	2
				V2	4
				I2	5
dr.9	Control type	44361	0h1109	MDBUS	6
				COMMS	8
				PLC	9
				PULSE	12
				V/Hz	0
				SlipCom	2
dr.10	Torque control	44362	0h110A	S-less1	4
				PM Sensor-less	6
dr.11	Inch Frequency	44363	0h110B	N / Y	0 / 1
dr.12	INCH acceleration time	44364	0h110C	dr.19 to dr.20	dr.19 to dr.20
dr.13	INCH deceleration time	44365	0h110D	0.0 to 600.0s	0 to 6000

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
dr.14	Motor power	44366	0h110E	0.2 kW	0
				0.4 kW	1
				0.75 kW	2
				1.1 kW	3
				1.5 kW	4
				2.2 kW	5
				3.0 kW	6
				3.7 kW	7
				4.0 kW	8
				5.5 kW	9
				7.5 kW	10
				11.0 kW	11
				15.0 kW	12
				18.5 kW	13
				22.0 kW	14
				30.0 kW	15
dr.15	Torque boost	44367	0h110F	Manual	0
				Auto1	1
				Auto2	2
dr.16	Start torque in forward direction	44368	0h1110	0.0 to 15.0%	0 to 150
dr.17	Start torque in reverse direction.	44369	0h1111	0.0 to 15.0%	0 to 150
dr.18	Motor frequency	44370	0h1112	30.00 to 400.00Hz	3000 to 40000
dr.19	Start frequency	44371	0h1113	0.01 to 10.00Hz	1 to 1000
dr.20	Max speed limit	44372	0h1114	40.00 to 400.00Hz	4000 to 40000
dr.21	Hz/Rpm Display	44373	0h1115	Hz	0
				Rpm	1

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
dr.80	Select ranges at power input	44432	0h1150	Run Freq.	0
				Accel. Time	1
				Decel. Time	2
				Cmd Source	3
				Ref. Source	4
				MultiStep 1	5
				MultiStep 2	6
				MultiStep 3	7
				Oupt. Curr.	8
				Motor RPM	9
				DC Voltage	10
				User Sel. 1	11
				Out of Order	12
				Sel. Run Dir.	13
				Oupt. Curr. 2	14
				Motor2 RPM	15
				DC Voltage2	16
				User Sel. 2	17
dr.81	Select monitor code	44433	0h1151	Volt V	0
				Pow kW	1
				Tq kgf	2
dr.89	Display changed parameters	40995	0h3E3	All	0
				Chang	1
dr.90	ESC key function	44442	0h115A	Mov. In. Pos.	0
				JOG Key	1
				Local/Rem.	2
dr.91	Eloader function	44443	0h115B	None	0
				Download	1
				Upload	2
dr.93	Parameter initialization	44445	0h115D	No	0
				All	1
				dr	2
				bA	3
				Ad	4
				Cn	5
				In	6
				OU	7
				CM	8
				AP	9
				Pr	12
				M2	13
				run	16

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
dr.94	Register password	44446	0h115E	0 to 9999	0 to 9999
dr.95	Lock password	44447	0h115F	0 to 9999	0 to 9999
dr.97	Software version	44449	0h1161	0 to 9999	0 to 9999
dr.98	IO Software version	44450	0h1162	0 to 65535	0 to 65535
dr.99	Hardware version	44451	0h1163	0 to 65535	0 to 65535
bA.1	Alt Speed Ref	44609	0h1201	None	0
				V1	1
				V2	3
				I2	4
				Pulse	6
bA.2	Aux Calc Type	44610	0h1202	M+(G*A)	0
				Mx (G*A)	1
				M/(G*A)	2
				M+[M*(G*A)]	3
				M+G*2(A-50%)	4
				Mx[G*2(A-50%)	5
				M/[G*2(A-50%)]	6
bA.3	Aux. Ref. Gain	44611	0h1203	M+M*G*2(A-50%)	7
				-200.0 to 200.0	-2000 to 2000
bA.4	Alt Ctrl Mode	44612	0h1204	LOCAL	0
				REMOTE	1
				REMOTE2	3
				MODBUS	4
				COMMS	5
bA.5	Alt Speed Ref	44613	0h1205	PLC	6
				LOCAL	0
				V1	2
				V2	3
				I2	4
bA.6	Torque Ref2	44614	0h1206	MDBUS	6
				COMMS	8
				PLC	9
				PULSE	12
bA.7	V/F Pattern	44615	0h1207	Linear	0
				Square	1
				V/F Us	2
				Square2	3
bA.8	Ramp T Mode	44616	0h1208	MaxFreq	0
				DeltaFreq	1

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
bA.9	Time scale	44617	0h1209	0.01s	0
				0.1s	1
				1s	2
bA.10	Input Frequency	44618	0h120A	60Hz	0
				50Hz	1
bA.11	POLE Number	44619	0h120B	2 to 48	2 to 48
bA.12	Rated Slip	44620	0h120C	0 to 3000rpm	0 to 3000
bA.13	Motor Current	44621	0h120D	1.0 to 1000.0A	10 to 10000
bA.14	No load Current	44622	0h120E	0.5 to 200.0A	5 to 2000
bA.15	Motor Voltage	44623	0h120F	170 to 480V	170 to 480
bA.16	Efficiency	44624	0h1210	64 to 100%	64 to 100
bA.17	Inertia Rate	44625	0h1211	0 to 8	0 to 8
bA.18	Trim Power %	44626	0h1212	70 to 130%	70 to 130
bA.19	AC Input Volt	44627	0h1213	170 to 230V	170 to 230
				320 to 480V	320 to 480
bA.20	Auto tuning	44628	0h1214	None	0
				All	1
				Allst	2
				Rs+Lsig	3
				Tr	6
				All PM	7
bA.21	Stator Resistor	44629	0h1215	Depend on motor settings	0 to 9999
bA.22	Leak Inductor	44630	0h1216		0 to 9999
bA.23	Stator Inductor	44631	0h1217		0 to 9999
bA.24	Rotor Time Const	44632	0h1218	25 to 5000ms	25 to 5000
bA.25	Stator Ind. Sca.	44633	0h1219	50 to 150%	50 to 150
bA.26	Rotor Ti Co Sca.	44634	0h121A	50 to 150%	50 to 150
bA.31	Regen. Ind. Scl.	44639	0h121F	70 to 100%	70 to 100
bA.32	Q-axis inductance scale	44640	0h1220	50 to 100%	50–100
bA.34	Auto tuning level for Ld and Lq	44641	0h1221	20.0–50.0%	20.0–50.0

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
bA.35	Auto tuning frequency for Ld and Lq	44642	0h1222	80.0–150.0%	80.0–150.0
bA.41	User Frequency 1	44649	0h1229	0.00 to dr.20	0.00 to dr.20
bA.42	User Voltage 1	44650	0h122A	0 to 100%	0 to 100
bA.43	User Frequency 2	44651	0h122B	0.00 to dr.20	0.00 to dr.20
bA.44	User Voltage 2	44652	0h122C	0 to 100%	0 to 100
bA.45	User Frequency 3	44653	0h122D	0.00 to dr.20	0.00 to dr.20
bA.46	User Voltage 3	44654	0h122E	0 to 100%	0 to 100
bA.47	User Frequency 4	44655	0h122F	0.00 to dr.20	0.00 to dr.20
bA.48	User Voltage 4	44656	0h1230	0 to 100%	0 to 100
St1	Multi-Reference1	44658	0h1232	0.00 to dr.20	0.00 to dr.20
St2	Multi-Reference2	44659	0h1233		
St3	Multi-Reference3	44660	0h1234		
bA.53	Multi-Reference4	44661	0h1235		
bA.54	Multi-Reference5	44662	0h1236	0.0 to 600.0s	0 to 6000
St3	Multi-Reference6	44663	0h1237		
bA.56	Multi-Reference7	44664	0h1238		
bA.70	Acc Ramp 2	44678	0h1246		
bA.71	Decel Ramp 2	44679	0h1247		
bA.72	Acc Ramp 3	44680	0h1248		
bA.73	Decel Ramp 3	44681	0h1249		
bA.74	Acc Ramp 4	44682	0h124A		
bA.75	Decel Ramp 4	44683	0h124B		
bA.76	Acc Ramp 5	44684	0h124C		
bA.77	Decel Ramp 5	44685	0h124D		
bA.78	Acc Ramp 6	44686	0h124E		
bA.79	Decel Ramp 6	44687	0h124F		
bA.80	Acc Ramp 7	44688	0h1250		
bA.81	Decel Ramp 7	44689	0h1251		
bA.82	Acc Ramp 8	44690	0h1252		
bA.83	Decel Ramp 8	44691	0h1253		
Ad.1	Acceleration pattern	44865	0h1301	Linear	0
Ad.2	Deceleration pattern	44866	0h1302	S-curve	1
Ad.3	S curve start acceleration slope	44867	0h1303	1 to 100%	1 to 100
Ad.4	S curve stop acceleration slope	44868	0h1304	1 to 100%	1 to 100

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
Ad.5	S curve start deceleration slope	44869	0h1305	1 to 100%	1 to 100
Ad.6	S curve stop deceleration slope	44870	0h1306	1 to 100%	1 to 100
Ad.7	Motor start mode	44871	0h1307	RAMP DCSTART	0 1
Ad.8	Stop mode	44872	0h1308	RAMP DC BRAKE SPIN POW BRKE	0 1 2 4
Ad.9	Allow speed inversion	44873	0h1309	None FWDPrev REVPrev	0 1 2
Ad.10	Power-on Run	44874	0h130A	N Y	0 1
Ad.12	Time to DC Start	44876	0h130C	0.00 to 60.00s	0 to 6000
Ad.13	Current injection DC start	44877	0h130D	0 to 200%	0 to 200
Ad.14	Pre-DC Brake Time	44878	0h130E	0.00 to 60.00s	0 to 6000
Ad.15	DC brake Time	44879	0h130F	0.00 to 60.00s	0 to 6000
Ad.16	Current level DC brake	44880	0h1310	0 to 200%	0 to 200
Ad.17	Frequency start DC brake	44881	0h1311	dr.19 to 60.00	dr.19 to 6000
Ad.20	Acceleration dwell frequency	44884	0h1314	dr.19 to dr.20	dr.19 to dr.20
Ad.21	Acceleration dwell time	44885	0h1315	0.0 to 60.0	0 to 600
Ad.22	Deceleration dwell frequency	44886	0h1316	dr.19 to dr.20	dr.19 to dr.20
Ad.23	Deceleration dwell time	44887	0h1317	0.0 to 60.0S	0 to 600
Ad.24	Use frequency limit	44888	0h1318	N S	0 1
Ad.25	Frequency lower limit	44889	0h1319	0.00 to Ad.26	0 to Ad.26
Ad.26	Frequency higher limit	44890	0h131A	Ad.25 to dr.20	Ad.25 to dr.20

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
Ad.27	Jump frequency activation	44891	0h131B	NO SI	0 1
Ad.28	Lower limit jump freq. 1	44892	0h131C	0.00 to dr.29	0 to dr.29
Ad.29	Upper limit jump freq. 1	44893	0h131D	Ad.28 to dr.20	Ad.28 to dr.20
Ad.30	Lower limit jump freq. 2	44894	0h131E	0.00 to dr.31	0 to dr.31
Ad.31	Upper limit jump freq. 2	44895	0h131F	Ad.30 to dr.20	Ad.30 to dr.20
Ad.32	Lower limit jump freq. 3	44896	0h1320	0.00 to dr.33	0 to dr.33
Ad.33	Upper limit jump freq. 3	44897	0h1321	Ad.32 to dr.20	Ad.32 to dr.20
Ad.41	Open brake current	44905	0h1329	0.0 to 180.0%	0 to 1800
Ad.42	Delay before brake opening	44906	0h132A	0.00 to 10.00s	0 to 1000
Ad.44	Brake opening forward freq.	44908	0h132C	0.00 to dr.20	0 to dr.20
Ad.45	Brake opening reverse freq.	44909	0h132D	0.00 to dr.20	0 to dr.20
Ad.46	Delay before brake closing	44910	0h132E	0.00 to 10.00s	0 to 1000
Ad.47	Brake closing frequency	44911	0h132F	0.00 to dr.20	0 to dr.20
Ad.50	Minimum flux mode	44914	0h1332	NONE MANU AUTO	0 1 2
Ad.51	Min. flux level in manual mode	44915	0h1333	0 to 30%	0 to 30
Ad.60	Acceleration dwell frequency	44924	0h133C	0.00 to dr.20	0 to dr.20
Ad.64	Fan operating mode	44928	0h1340	DuringRun Always ON Temp Ctrl	0 1 2
Ad.65	Save motorized potentiometer frequency	44929	0h1341	N Y	0 1

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
Ad.66	Select comparator source	44930	0h1342	None	0
				V1	1
				V2	3
				I2	4
				Pulse	6
Ad.67	Output activation level comparator mode	44931	0h1343	Ad.68 a 100.00	Ad.68 a 10000
Ad.68	Output deactivation level comparator mode	44932	0h1344	-100.00 a Ad.67	-10000 a Ad.67
Ad.70	Safe operation selection	44934	0h1346	Always Enable	0
				DI Dependent	1
Ad.71	Safe operation stop	44935	0h1347	Free-Run	0
				Q-Stop	1
				Q-Stop Res	2
Ad.72	Q-Stop Time	44936	0h1348	0.0 to 600.0s	0 to 6000
Ad.74	Enable regeneration prevention	44938	0h134A	NO	0
				YES	1
Ad.75	Regeneration prevention level	44939	0h134B	300 to 400V 600 to 800V	300 to 400 600 to 800
Ad.76	Compare frequency limit	44940	0h134C	0.00 to 10.00Hz	0 to 1000
Ad.77	P gain regeneration prevention	44941	0h134D	0.0 to 100.0%	0 to 1000
Ad.78	I gain regeneration prevention	44942	0h134E	0.0 to 3000.0ms	0 to 30000
Ad.80	Fire mode selection	44944	0h1350	None	0
				Fire Mode	1
				Fire Mode Test	2
Ad.81	Fire mode frequency	44945	0h1351	0.00 to 60.00Hz	0 to 6000
Ad.82	Fire mode direction	44946	0h1352	Forward	0
				Reverse	1
Cn.4	Modulation frequency	45124	0h1404	0.7 to 15.0	7 to 150
Cn.5	Modulation mode	45125	0h1405	Normal PWM	0
				LowLeakage PWM	1
Cn.9	Pre-excitation time	45129	0h1409	0.00 to 60.00s	0 to 6000

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
Cn.10	Pre-excitation time	45130	0h140A	100.0 to 500.0%	1000 to 5000
Cn.11	Power off delay	45131	0h140B	0.00 to 60.00s	0 to 6000
Cn.12	PM speed controller P gain 1	45133	0h140D	0-5000	0-5000
Cn.13	PM speed controller I gain 1	45135	0h140F	0-5000	0-5000
Cn.15	PM speed controller P gain 2	45136	0h1410	0-5000	0-5000
Cn.16	PM speed controller I gain 2	45136	0h1410	0-9999	0-9999
Cn.20	Sensorless control gain 2	45140	0h1414	NO YES	0 1
Cn.21	ASR proportional gain 1	45141	0h1415	0 to 5000%	0 to 5000
Cn.22	ASR integral time 1	45142	0h1416	10 to 9999ms	10 to 9999
Cn.23	Independent controller prop. gain 2	45143	0h1417	1.0 to 1000.0%	10 to 10000
Cn.24	Indep. controller integral gain 2	45144	0h1418	1.0 to 1000.0%	10 to 10000
Cn.25	Integral time sensorless contr.	45145	0h1419	10 to 999ms	10 to 9999
Cn.26	Flux estimator proportional gain	45146	0h141A	1 to 200%	1 to 200
Cn.27	Flux estimator integral gain	45147	0h141B	1 to 200%	1 to 200
Cn.28	Speed estimator prop. gain 1	45148	0h141C	0 to 32767	0 to 32767
Cn.29	Speed estimator integral gain 1	45149	0h141D	100 to 1000	100 to 1000
Cn.30	Speed estimator integral gain 2	45150	0h141E	100 to 10000	100 to 10000
Cn.31	Sensorless cont. prop. gain	45151	0h141F	10 to 1000	10 to 1000
Cn.32	Sensorless cont. integral gain	45152	0h1420	10 to 1000	10 to 1000
Cn.33	PM D-axis back-EMF estimated gain (%)	45153	0h1421	0-300.0%	0-300.0

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
Cn.34	PM Q-axis back-EMF estimated gain (%)	45154	0h1422	0–300.0%	0–300.0
Cn.35	Initial pole position estimation retry	45155	0h1423	0–10	0–10
Cn.36	Initial pole position estimation interval	45156	0h1424	1–100ms	1–100
Cn.37	Initial pole position estimation pulse current (%)	45157	0h1425	10–100%	10–100
Cn.38	Initial pole position estimation pulse voltage (%)	45158	0h1426	100–4000	100–4000
Cn.39	PM dead-time range (%)	45159	0h1427	50.0–200.0%	50.0–200.0
Cn.40	PM dead-time voltage (%)	45160	0h1428	50.0–200.0%	50.0–200.0
Cn.41	PM speed estimator proportional gain	45161	0h1429	0–32000	0–32000
Cn.42	PM speed estimator integral gain	45168	0h1430	0–32000	0–32000
Cn.43	PM speed estimator proportional gain 2	45169	0h1431	0–32000	0–32000
Cn.44	PM speed estimator integral gain 2	45170	0h1432	0–32000	0–32000
Cn.45	Speed estimator feedforward high speed range (%)	45171	0h1433	0–1000%	0–1000

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
Cn.46	Initial pole position estimation type	45172	0h1434	0-2	0-2
Cn.48	Controller P gain	45168	0h1430	10 to 10000	10 to 10000
Cn.49	Controller I gain	45169	0h1431	10 to 10000	10 to 10000
Cn.50	Voltage controller limit	45170	0h1432	0-1000%	0-1000
Cn.51	Voltage controller I gain	45171	0h1433	0-20000%	0-20000
Cn.52	Output filter vector	45172	0h1434	0 to 2000ms	0 to 2000
Cn.53	Torque limit reference	45173	0h1435	LOCAL	0
				V1	2
				V2	4
				I2	5
				MDBUS	6
				COMMS	8
				PLC	9
Cn.54	Forward positive torque limit	45174	0h1436	Pulse	12
Cn.55	Forward negative torque limit	45175	0h1437	0.0 to 200.0%	0 to 2000
Cn.56	Reverse positive torque limit	45176	0h1438	0.0 to 200.0%	0 to 2000
Cn.57	Reverse negative torque limit	45177	0h1439	0.0 to 200.0%	0 to 2000
Cn.62	Speed limit reference	45182	0h143E	LOCAL	0
				V1	2
				V2	4
				I2	5
				MDBUS	6
				COMMS	7
				PLC	8
Cn.63	Forward speed limit	45183	0h143F	0.00 to 400.00Hz	0 to 40000
Cn.64	Reverse speed limit	45184	0h1440	0.00 to 400.00Hz	0 to 40000
Cn.65	Speed limit gain	45185	0h1441	100 to 5000%	100 to 5000
Cn.70	Speed search mode selection	45190	0h1446	Flying Start1	0
				Flying Start2	1
Cn.71	Search mode	45191	0h1447	00 to 15	0 to 15

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
Cn.72	Speed search mode current	45192	0h1448	80 to 200%	80 to 200
Cn.73	Speed search mode prop. gain	45193	0h1449	0 to 9999	0 to 9999
Cn.74	Speed search integral gain	45194	0h144A	0 to 9999	0 to 9999
Cn.75	Speed search delay	45195	0h144B	0.0 to 60.0s	0 to 600
Cn.76	Speed estimator gain	45196	0h144C	50 to 150%	50 to 150
Cn.77	KEB Select	45197	0h144D	No KEB1 KEB2	0 1 2
Cn.78	Initial value for KEB operation	45198	0h144E	110.0 to 200.0%	1100 to 2000
Cn.79	Value to stop KEB operation	45199	0h144F	Cn.78 to 210.0%	Cn.78 to 2100
Cn.80	KEB proportional gain	45200	0h1450	1 to 20000	1 to 20000
Cn.81	KEB integral gain	45201	0h1451	1 to 20000	1 to 20000
Cn.82	Energy buffering slip gain	45202	0h1452	0 to 2000.0%	0 to 20000
Cn.83	Energy buffering acceleration time	45203	0h1453	0.0 to 600.0 s	0 to 6000
Cn.85	Flux proportional gain 1	45205	0h1455	100 to 700	100 to 700
Cn.86	Flux proportional gain 2	45206	0h1456	0 to 100	0 to 100
Cn.87	Flux proportional gain 3	45207	0h1457	0 to 500	0 to 500
Cn.88	Flux integral gain 1	45208	0h1458	0 to 200	0 to 200
Cn.89	Flux integral gain 2	45209	0h1459	0 to 200	0 to 200
Cn.90	Flux integral gain 3	45210	0h145A	0 to 200	0 to 200
Cn.91	SL voltage compensation 1	45211	0h145B	0 to 60	0 to 60
Cn.92	SL voltage compensation 2	45212	0h145C	0 to 60	0 to 60

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
Cn.93	SL voltage compensation 3	45213	0h145D	0 to 60	0 to 60
Cn.94	SL fluctuation frequency	45214	0h145E	80.0 to 110.0%	800 to 1100
Cn.95	SL switching frequency	45215	0h145F	0.00 to 8.00Hz	0 to 800
In.1	Analog input max. freq	45377	0h1501	dr.19 to dr.20	dr.19 to dr.20
In.2	Analog input max. torque	45378	0h1502	0.0 to 200.0	0 to 2000
In.5	V1 Monitor	45381	0h1505	0.00 to 12.00%	0 to 1200
In.6	V1 polarity	45382	0h1506	0-10V -/+10V	0 1
In.7	V1 filter	45383	0h1507	0 to 10000ms	0 to 10000
In.8	V1 minimum voltage	45384	0h1508	0.00 to 10.00V	0 to 1000
In.9	V1 minimum reference	45385	0h1509	0.00 to 100.00%	0 to 10000
In.10	V1 maximum voltage	45386	0h150A	0.00 to 10.00V	0 to 1000
In.11	V1 maximum reference	45387	0h150B	0.00 to 100.00%	0 to 10000
In.12	V1 minimum negative voltage	45388	0h150C	-10.00 to 0.00V	-1000 to 0
In.13	V1 minimum negative reference	45389	0h150D	-100.00 to 0.00%	-10000 to 0
In.14	V1 maximum negative voltage	45390	0h150E	-10.00 to 0.00V	-1000 to 0
In.15	V1 maximum neg. reference	45391	0h150F	-100.00 to 0.00%	-10000 to 0
In.16	V1 Inverting	45392	0h1510	NO YES	0 1
In.17	Adjust V1 quantification	45393	0h1511	0.04 to 10.00%	4 to 1000
In.35	V2 Monitor	45411	0h1523	0.00 to 12.00V	0 to 1200
In.37	V2 filter	45413	0h1525	0 to 10000ms	0 to 10000
In.38	V2 minimum voltage	45414	0h1526	0.00 to 10.00V	0 to 1000

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
In.39	V2 minimum reference	45415	0h1527	0.00 to 100.00%	0 to 10000
In.40	V2 maximum voltage	45416	0h1528	0.00 to 10.00V	0 to 1000
In.41	V2 maximum reference	45417	0h1529	0.00 to 100.00%	0 to 10000
In.46	V2 Inverting	45422	0h152E	NO YES	0 1
In.47	Adjust I2 visualization	45423	0h152F	0.04 to 10.00%	4 to 1000
In.50	I2 Monitor	45426	0h1532	0.00 to 24.00mA	0 to 2500
In.52	I2 filter	45428	0h1534	0 to 10000ms	0 to 10000
In.53	I2 minimum current	45429	0h1535	0.00 to 20.00mA	0 to 2000
In.54	I2 minimum reference	45430	0h1536	0.00 to 100.00%	0 to 10000
In.55	I2 maximum current	45431	0h1537	0.00 to 24.00mA	0 to 1000
In.56	I2 maximum reference	45432	0h1538	0.00 to 100.00	0 to 10000
In.61	I2 Inverting	45437	0h153D	N Y	0 1
In.62	Adjust I2 visualization	45438	0h153E	0.04 to 10.00%	4 to 1000
In.65	Digital input 1	45441	0h1541	None START(+) START(-) RESET	0 1 2 3
In.66	Digital input 2	45442	0h1542	EXT TRIP DIS START INCH 1 SPEED-L SPEED-M SPEED-H	4 5 6 7 8 9
In.67	Digital input 3	45443	0h1543	XCEL-L XCEL-M RUN Enable 3-WIRE	11 12 13 14
In.68	Digital input 4	45444	0h1544	CTR/REF 2 Exchange UP DOWN	15 16 17 18
In.69	Digital input 5	45445	0h1545	RESERVED POT CLEAR AnalogHLD	19 20 21

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
In.70	Digital input 6	45446	0h1546	PIDOPLoop	22
				P Gain 2	24
				XCEL Stop	25
				2nd Motor	26
				Pre-Excit	34
In.71	Digital input 7	45447	0h1547	Timer IN	38
				disAuxRef.	40
				INCH(+)	46
				INCH(-)	47
				XCEL-H	49
				PLC	50
				Fire Mode	51
				KEB1 Sel	52
				TI	54
In.85	Digital input activation delay	45461	0h1555	0 to 10000ms	0 to 10000
In.86	Digital input deactivation delay	45462	0h1556	0 to 10000ms	0 to 10000
In.87	Digital input contact type	45463	0h1557	0: Contact normally open (NO) 1: Contact normally closed (NC)	0000 to 1111
In.89	Di Scan Time	45465	0h1559	1 to 5000ms	1 to 5000
In.90	Digital inputs status	45466	0h155A	0: Disabled 1: Enabled	0000 to 1111
In.91	TI Monitor	45467	0h155B	0.00 to 50.00kHz	0 to 5000
In.92	TI Filter	45468	0h155C	0 to 9999	0 to 9999
In.93	TI minimum input frequency	45469	0h155D	0.00 to 32.00kHz	0 to 3200
In.94	TI minimum input frequency percentage	45470	0h155E	0.00 to 100.00%	0 to 10000
In.95	TI maximum input frequency	45471	0h155F	0.00 to 32.00kHz	0 to 3200
In.96	TI maximum input frequency percentage	45472	0h1560	0.00 to 100.00%	0 to 10000
In.97	TI Inverting	45473	0h1561	NO YES	0 1
In.98	TI noise reduction level	45474	0h1562	0.04 to 10.00%	4 to 1000

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
In.99	Input mode setting	45475	0h1563	V2, NPN	00
				V2, PNP	01
				I2, NPN	10
				I2, PNP	11
OU.1	Analog output 1 mode selection	45633	0h1601	Frequency	0
				O/pCurr	1
				O/pVolt	2
				DCLinkV	3
				Torque	4
				O/pPower	5
				Idse	6
				Iqse	7
				TargetFq	8
				RampFreq	9
				Speed Fdb	10
				PIDRefVal	12
				PIDFdbVal	13
				PIDO/p Constant	14 15
OU.2	Analog output 1 gain	45634	0h1602	-1000.0 to 1000.0%	-10000 to 10000
OU.3	Analog output 1 offset	45635	0h1603	-100.0 to 100.0%	-1000 to 1000
OU.4	Analog output 1 filter	45636	0h1604	0 to 10000ms	0 to 10000
OU.5	Analog output 1 constant	45637	0h1605	0.0 to 100.0%	0 to 1000
OU.6	Analog output 1 monitor	45638	0h1606	0.0 to 1000.0%	0 to 10000
OU.30	Relay fault output	45662	0h161E	Low voltage	001
				Other than low voltage	010
				Automatic restart	100

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
OU.31	Relay 1 control source	45663	0h161F	None	0
				FDT-1	1
				FDT-2	2
				FDT-3	3
				FDT-4	4
				OverLoad	5
				IOL	6
				UndrLoad	7
				VentWarn	8
				Stall	9
				OverVolt	10
				LowVolt	11
OU.33	Digital output 1 function	45665	0h1621	OverHeat	12
				Lost Command	13
				Run	14
				Stop	15
				Steady	16
				Inv. Line	17
				Comm Line	18
				Spd Srch	19
				Ready	22
				Timer Out	28
				Trip	29
				DBWarn%ED	31
OU.41	Digital outputs status	45673	0h1629	COMPARAT	34
				BRCtrl	35
				CAP Exch.	36
				FAN Exch.	37
				Fire Mode	38
				TO	39
				KEB Op.	40
				00 to 11	0 to 3
OU.50	Digital output connection delay	45682	0h1632	0.00 to 100.00s	0 to 10000
OU.51	Digital output disconnection delay	45683	0h1633	0.00 to 100.00s	0 to 10000

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
OU.52	NC/NO Relays logic	45684	0h1634	0: Contact normally open (NO) 1: Contact normally closed (NC)	00 a 11
OU.53	Digital output connection delay on fault	45685	0h1635	0.00 to 100.00s	0 to 10000
OU.54	Digital output disconnection delay on fault	45686	0h1636	0.00 to 100.00s	0 to 10000
OU.55	Digital output connection delay	45687	0h1637	0.00 to 100.00s	0 to 10000
OU.56	Digital output disconnection delay	45688	0h1638	0.00 to 100.00s	0 to 10000
OU.57	Relay FDT level	45689	0h1639	0.00 to dr.20	0 to dr.20
OU.58	Relay FDT band	45690	0h163A	0.00 to dr.20	0 to dr.20
OU.61	Pulse output mode	45693	0h163D	Frequency	0
				O/pCurr	1
				O/pVolt	2
				DCLinkV	3
				Torque	4
				O/pPower	5
				Idse	6
				Iqse	7
				TargetFq	8
				RampFreq	9
				Speed Fdb	10
				PIDRefVal	12
				PIDFdbVal	13
				PIDO/p	14
				Constant	15
OU.62	Pulse output gain	45694	0h163E	-1000.0 to 1000.0%	-10000 to 10000
OU.63	Pulse output offset	45695	0h163F	-100.0 to 100.0%	-1000 to 1000
OU.64	Pulse output filter	45696	0h1640	0 to 10000ms	0 to 10000
OU.65	Pulse output constant setting	45697	0h1641	0.0 to 100.0%	0 to 1000
OU.66	Pulse output monitor	45698	0h1642	0.0 to 1000.0%	0 to 10000

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
CM.1	Slave address	45889	0h1701	1 to 250	1 to 250
CM.2	RS-485 communication protocol	45890	0h1702	Modbus PE BUS 485	0 1
CM.3	Baud Rate	45891	0h1703	1200 bps	0
				2400 bps	1
				4800 bps	2
				9600 bps	3
				19200 bps	4
				38400 bps	5
				56 Kbps	6
CM.4	Communication frame structure	45892	0h1704	115 Kbps	7
				D8/PN/S1	0
				D8/PN/S2	1
				D8/PE/S1	2
CM.5	Response delay	45893	0h1705	0 to 100.0 ms	0 to 1000
CM.6	Communication option S/W version	-	0h1706	-	-
CM.7	Communication option ID	-	0h1707	0 to 255	0 to 255
CM.8	Card baud rate	-	0h1708	-	-
CM.9	Comm. option LED status	-	0h1709	-	-
CM.30	Output parameters number	-	0h171E	0 to 8	0 to 8
CM.31	Output communication addresses 1 to 8	-	0h171F	0000 to FFFF	0000 to FFFF
CM.32		-	0h1720		
CM.33		-	0h1721		
CM.34		-	0h1722		
CM.35		-	0h1723		
CM.36		-	0h1724		
CM.37		-	0h1725		
CM.38		-	0h1726		
CM.50	Number of input parameters	-	0h1732	0 to 8	0 to 8
CM.51	Input communication addresses 1 to 8	-	0h1733	0000 to FFFF	0000 to FFFF
CM.52		-	0h1734		
CM.53		-	0h1735		
CM.54		-	0h1736		

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
CM.55		-	0h1737		
CM.56		-	0h1738		
CM.57		-	0h1739		
CM.58		-	0h173A		
CM.68	Field bus data swap	-	0h1744	NO YES	0 1
				None	0
CM.70		-	0h1746	START(+) START(-) RESET	1 2 3
				EXTTRIP	4
CM.71		-	0h1747	DISSTART INCH1	5 6
				SPEED-L	7
				SPEED-M	8
				SPEED-H	9
CM.72		-	0h1748	XCEL-L XCEL-M	11 12
				RUNEnable	13
				3-WIRE	14
CM.73		-	0h1749	CTR/REF2 Exchange	15 16
	Communication multifunction input 1 to 7			UP	17
				DOWN	18
CM.74		-	0h174A	POTCLEAR AnalogHLD	20 21
				I-Term Clear	22
				PIDOPLoop	23
				PGain2	24
CM.75		-	0h174B	XCELStop 2ndMotor	25 26
				Pre-Excit	34
				TimerIN	38
CM.76		-	0h174C	disAuxRef. INCH(+)	40 46
				INCH(-)	47
				XCEL-H	49
				PLC	50
CM.77		-	0h174D	FireMode	51
				KEB1Sel	52
				TI	54

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
CM.86	Communication multifunction input monitor	-	0h1756	-	-
CM.90	Data frame comm. monitor	-	0h175A	PE BUS 485 Rem. display	0 1
CM.91	Received data frames counter	-	0h175B	0 to 65535	0 to 65535
CM.92	Frames with error counter	-	0h175C	0 to 65535	0 to 65535
CM.93	NAK frames counter	-	0h175D	0 to 65535	0 to 65535
CM.94	Communications update	-	-	NO YES	0 1
CM.95	P2P communication selection	-	0h1760	Disable All P2P Master P2P Slave M-KPD Ready	0 1 2 3
CM.96	Digital output selection	-	-	Analog output Multi-function relay Multi-function output	001 010 100
AP.1	Application function selection	46145	0h1801	None Proc PID	0 2
AP.2	Enable PLC mode	-	-	N Y	0 1
AP.16	PID output	46160	0h1810	-327.68 to 327.68%	32768 to 32768
AP.17	PID reference	46161	0h1811	-327.68 to 327.68%	32768 to 32768
AP.18	PID feedback	46162	0h1812	-327.68 to 327.68%	32768 to 32768
AP.19	PID local	46163	0h1813	-100.00 to 100.00%	10000 to 10000
AP.20	Select PID regulator source	46164	0h1814	MREF V1 V2 I2 MODBUS COMMS PLC PULSE	0 1 3 4 5 7 8 11

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
AP.21	Select feedback signal source	46165	0h1815	V1	0
				V2	2
				I2	3
				MODBUS	4
				COMMS	6
				PLC	7
				PULSE	10
AP.22	PID controller proportional gain	46166	0h1816	0.0 to 1000.0%	0 to 10000
AP.23	PID controller integration time	46167	0h1817	0 to 200.0s	0 to 2000
AP.24	PID controller differential time	46168	0h1818	0.0 to 10000ms	0 to 10000
AP.25	PID output fine adjustment	46169	0h1819	0.0 to 1000.0%	0 to 10000
AP.26	Proportional gain scale	46170	0h181A	0.0 to 100.0%	0 to 1000
AP.27	PID Filter	46171	0h181B	0 to 10000ms	0 to 10000
AP.28	PID Mode	46172	0h181C	Process	0
				Normal	1
AP.29	Upper limit PID output	46173	0h181D	AP.30 to 300.00Hz	AP.30 to 30000
AP.30	Lower limit PID output	46174	0h181E	-300.00Hz to AP.29	30000 to AP.29
AP.31	Invert PID	46175	0h181F	NO	0
				YES	1
AP.32	PID output scale	46176	0h1820	0.1 to 1000.0%	1 to 10000
AP.34	PrePID reference	46178	0h1822	0.00 to dr.20	0 to dr.20
AP.35	PrePID end reference	46179	0h1823	0.0 to 100.0%	0 to 1000
AP.36	PrePID delay	46180	0h1824	0 to 9999s	0 to 9999
AP.37	Sleep mode activation delay	46181	0h1825	0.0 to 999.9s	0 to 9999
AP.38	Sleep mode activation speed	46182	0h1826	0.00Hz to dr.20	0 to dr.20
AP.39	Awakening level	46183	0h1827	0 to 100%	0 to 100
AP.40	PID WakeUp Mode	46184	0h1828	Below	0
				Above	1
				Beyond	2

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
AP.42	PID unit	46186	0h182A	%	0
				Bar	1
				mBar	2
				Pa	3
				kPa	4
				Hz	5
				rpm	6
				V	7
				I	8
				kW	9
				HP	10
				°C	11
				°F	12
AP.43	PID unit gain	46187	0h182B	0.00 to 300.00%	0 to 30000
AP.44	PID scale unit	46188	0h182C	x100	0
				x10	1
				x 1	2
				x 0.1	3
				x 0.01	4
AP.45	Proportional gain	46189	0h182D	0.0 to 1000.0%	0 to 10000
Pr.4	Load duty type	46916	0h1B04	NRML	0
				HEVY	1
Pr.5	Phase loss type	46917	0h1B05	NONE	0
				OUTPUT	1
				INPUT	2
				ALL	3
Pr.6	Ripple voltage	46918	0h1B06	1 to 100V	1 to 100
Pr.7	Fault deceleration time	46919	0h1B07	0.0 to 600.0s	0 to 6000
Pr.8	Start after restart	46920	0h1B08	N	0
				Y	1
Pr.9	Retry attempts number	46921	0h1B09	0 to 10	0 to 10
Pr.10	Retry delay	46922	0h1B0A	0.0 to 60.0s	0 to 600

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
Pr.12	Response in case of a speed reference loss	46924	0h1B0C	None	0
				Free-Run	1
				Dec	2
				Hold Input	3
				Hold Output	4
				Lost Preset	5
Pr.13	Lost reference delay	46925	0h1B0D	0.1 to 120.0s	0 to 1200
Pr.14	Reference for lost reference	46926	0h1B0E	(dr.19 to dr.20)	(dr.19 to dr.20)
Pr.15	AI Lost Level	46928	0h1B10	Half	0
				Below	1
Pr.17	Overload warning select	46929	0h1B11	NO	0
				YES	1
Pr.18	Overload warning level	46930	0h1B12	30 to 180%	30 to 180
Pr.19	Overload warning time	46931	0h1B13	0.0 to 30.0s	0 to 300
Pr.20	Overload trip select	46932	0h1B14	None	0
				Free-Run	1
				Dec	2
Pr.21	Overload level	46933	0h1B15	30 to 200%	30 to 200
Pr.22	Overload trip time	46934	0h1B16	0.0 to 60.0s	0 to 600
Pr.25	Enable underload	46937	0h1B19	NO	0
				YES	1
Pr.26	Underload warning delay	46938	0h1B1A	0.0 to 600.0s	0 to 6000
Pr.27	Underload fault mode	46939	0h1B1B	None	0
				Free-Run	1
				Dec	2
Pr.28	Underload fault delay	46940	0h1B1C	0.0 to 600.0s	0 to 6000
Pr.29	Underload minimum level	46941	0h1B1D	10 to 100%	10 to 100
Pr.30	Underload maximum level	46942	0h1B1E	10 to 100%	10 to 100
Pr.31	Action in case no motor is detected	46943	0h1B1F	None	0
				Free-Run	1
				Dec	2
Pr.32	No motor fault level	46944	0h1B20	1 to 100%	1 to 100

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
Pr.33	No motor fault delay	46945	0h1B21	0.1 to 10.0s	1 to 100
Pr.40	Action in case of thermo-electronic fault	46952	0h1B28	None Free-Run Dec	0 1 2
Pr.41	Motor cooling mode at zero speed	46953	0h1B29	SELF FORCED	0 1
Pr.42	Overcurrent level during 1min	46954	0h1B2A	120 to 200%	120 to 200
Pr.43	Continuous overcurrent level	46955	0h1B2B	50 to 150%	50 to 150
Pr.45	Free run trip mode	46957	0h1B2D	FreeRun Dec	0 1
Pr.50	Stall prevention	46962	0h1B32	Accelerating At constant speed At deceleration FluxBraking	00 01 10 11
Pr.51	Speed for stall protection 1	46963	0h1B33	dr.19 to Pr.53 Hz	dr.19 to Pr.53
Pr.52	Level for stall protection 1	46964	0h1B34	30 to 250%	30 to 250
Pr.53	Speed for stall protection 2	46965	0h1B35	ln.55 to Pr.55 Hz	ln.55 to Pr.55
Pr.54	Level for stall protection 2	46966	0h1B36	30 to 250%	30 to 250
Pr.55	Speed for stall protection 3	46967	0h1B37	ln.53 to Pr.57 Hz	ln.53 to Pr.57
Pr.56	Level for stall protection 3	46968	0h1B38	30 to 250%	30 to 250
Pr.57	Speed for stall protection 4	46969	0h1B39	ln.55 to dr.20 Hz	ln.55 to dr.20
Pr.58	Level for stall protection 4	46970	0h1B3A	30 to 250%	30 to 250
Pr.59	Flux braking gain	46971	0h1B3B	0 to 150%	0 to 150
Pr.60	CAP diagnosis level	46972	0h1B3C	0 to 100%	0 to 100
Pr.61	Capacitor diagnosis mode	46973	0h1B3D	Nonde RefDiag PreDiag InitDiag	0 1 2 3

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
Pr.62	CAP exchange warning level	46974	0h1B3E	0.0 to 95.0%	0 to 950
Pr.63	Capacitance reference	46975	0h1B3F	0.0 to 100.0%	0 to 1000
Pr.66	Braking resistor configuration	46978	0h1B42	0 to 30%	0 to 30
Pr.73	Speed deviation fault	46946	0h1B22	N Y	0 1
Pr.74	Speed deviation band	46947	0h1B23	1 to 20	1 to 20
Pr.75	Speed deviation time	46948	0h1B24	1 to 120	1 to 120
Pr.79	Action in case of fan trip	46991	0h1B4F	Trip Warn	0 1
Pr.80	Optional card trip mode	46992	0h1B50	None Free-Run Dec	0 1 2
Pr.81	Low voltage trip delay	46993	0h1B51	0.0 to 60.0s	0 to 600
Pr.82	Enable low voltage trip	46994	0h1B52	NO YES	0 1
Pr.86	Fan use percentage	46998	0h1B56	0.0 to 100.0%	0 to 1000
Pr.87	Fan exchange warning level	46999	0h1B57	0.0 to 100.0%	0 to 1000
Pr.88	Fan time reset	47000	0h1B58	N Y	0 1
Pr.89	CAP fan status	47001	0h1B59	None CAP warning FAN warning	00 01 10
Pr.90	Warning information	47003	0h1B5A	-	-
Pr.91	Fifth fault	47004	0h1B5B	-	-
Pr.92	Fourth fault	47005	0h1B5C	-	-
Pr.93	Third fault	46917	0h1B04	-	-
Pr.94	Second fault	46918	0h1B05	-	-
Pr.95	First fault	46919	0h1B06	-	-
Pr.96	Reset fault history	46920	0h1B07	0 to 1	0 to 1
M2.4	Motor 2 acceleration ramp	47172	0h1C04	0.0 to 600.0s	0 to 6000

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
M2.5	Motor 2 deceleration ramp	47173	0h1C05	0.0 to 600.0s	0 to 6000
				0.2kW	0
				0.4kW	1
				0.75kW	2
				1.1kW	3
				1.5kW	4
				2.2kW	5
				3.0kW	6
M2.6	Motor 2 rated power	47174	0h1C06	3.7kW	7
				4.0kW	8
				5.5kW	9
				7.5kW	10
				11.0kW	11
				15.0kW	12
				18.5kW	13
				22.0kW	14
				30.0kW	15
M2.7	Motor 2 frequency	47175	0h1C07	30.00 to 400.00Hz	3000 to 40000
M2.8	Control type selection	47176	0h1C08	V/Hz	0
				SlipCom	2
				S-less1	4
				2	2
M2.10	Poles number	47178	0h1C0A	4	4
			
				48	48
M2.11	Rated slip	47179	0h1C0B	0 to 3000rpm	0 to 3000
M2.12	Motor nominal current	47180	0h1C0C	1.0 to 200.0A	10 to 2000
M2.13	No load current	47181	0h1C0D	0.5 to 200.0A	5 to 2000
M2.14	Motor 2 voltage	47182	0h1C0E	180 to 480V	180 to 480
M2.15	Motor 2 efficiency	47183	0h1C0F	70 to 100%	70 to 100
M2.16	Motor 2 inertia rate	47184	0h1C10	0 to 8	0 to 8
M2.17	Stator resistor	47185	0h1C11	Depend on motor setting	0 to 9999
M2.18	Leak inductor	47186	0h1C12		0 to 9999
M2.19	Stator inductor	47187	0h1C13		0 to 9999
M2.20	Rotor time constant	47188	0h1C14	25 to 5000ms	5000

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
M2.25	V/F pattern	47193	0h1C19	Linear	0
				Square	1
				V/F User	2
				Square2	3
M2.26	Torque in forward direction	47194	0h1C1A	0.0 to 15.0%	0 to 150
M2.27	Torque in reverse direction	47195	0h1C1B	0.0 to 15.0%	0 to 150
M2.28	Stall prevention level motor 2	47196	0h1C1C	30 to 150%	30 to 150
M2.29	Motor 2 overcurrent level 1 min	47197	0h1C1D	100 to 200%	100 to 200
M2.30	Motor 2 continuous overcurrent	47198	0h1C1E	50 to 150%	50 to 150
US.1	PLC operation mode	47425	0h1D01	Stop	0
				Run	1
				Run DI	2
US.2	PLC loop time	47426	0h1D02	0.01s	0
				0.02s	1
				0.05s	2
				0.1s	3
				0.5s	4
US.11	Output link address PLC func. 1	47435	0h1D0B	1s	5
US.12	Output link address PLC func. 2	47436	0h1D0C	0 to 65535	0 to 65535
US.13	Output link address PLC func. 3	47437	0h1D0D	0 to 65535	0 to 65535
US.14	Output link address PLC func. 4	47438	0h1D0E	0 to 65535	0 to 65535
US.15	Output link address PLC func. 5	47439	0h1D0F	0 to 65535	0 to 65535
US.16	Output link address PLC func. 6	47440	0h1D10	0 to 65535	0 to 65535
US.17	Output link address PLC func. 7	47441	0h1D11	0 to 65535	0 to 65535
US.18	Output link address PLC func. 8	47442	0h1D12	0 to 65535	0 to 65535

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
US.19	Output link address PLC func. 9	47443	0h1D13	0 to 65535	0 to 65535
US.20	Output link addr. PLC func. 10	47444	0h1D14	0 to 65535	0 to 65535
US.21	Output link addr. PLC func. 11	47445	0h1D15	0 to 65535	0 to 65535
US.22	Output link addr. PLC func. 12	47446	0h1D16	0 to 65535	0 to 65535
US.23	Output link addr. PLC func. 13	47447	0h1D17	0 to 65535	0 to 65535
US.24	Output link addr. PLC func. 14	47448	0h1D18	0 to 65535	0 to 65535
US.25	Output link addr. PLC func. 15	47449	0h1D19	0 to 65535	0 to 65535
US.26	Output link addr. PLC func. 16	47450	0h1D1A	0 to 65535	0 to 65535
US.27	Output link addr. PLC func. 17	47451	0h1D1B	0 to 65535	0 to 65535
US.28	Output link addr. PLC func. 18	47452	0h1D1C	0 to 65535	0 to 65535
US.31	PLC input value 1	47455	0h1D1F	-9999 to 9999	-9999 to 9999
US.32	PLC input value 2	47456	0h1D20	-9999 to 9999	-9999 to 9999
US.33	PLC input value 3	47457	0h1D21	-9999 to 9999	-9999 to 9999
US.34	PLC input value 4	47458	0h1D22	-9999 to 9999	-9999 to 9999
US.35	PLC input value 5	47459	0h1D23	-9999 to 9999	-9999 to 9999
US.36	PLC input value 6	47460	0h1D24	-9999 to 9999	-9999 to 9999
US.37	PLC input value 7	47461	0h1D25	-9999 to 9999	-9999 to 9999
US.38	PLC input value 8	47462	0h1D26	-9999 to 9999	-9999 to 9999
US.39	PLC input value 9	47463	0h1D27	-9999 to 9999	-9999 to 9999
US.40	PLC input value 10	47464	0h1D28	-9999 to 9999	-9999 to 9999
US.41	PLC input value 11	47465	0h1D29	-9999 to 9999	-9999 to 9999
US.42	PLC input value 12	47466	0h1D2A	-9999 to 9999	-9999 to 9999
US.43	PLC input value 13	47467	0h1D2B	-9999 to 9999	-9999 to 9999
US.44	PLC input value 14	47468	0h1D2C	-9999 to 9999	-9999 to 9999
US.45	PLC input value 15	47469	0h1D2D	-9999 to 9999	-9999 to 9999
US.46	PLC input value 16	47470	0h1D2E	-9999 to 9999	-9999 to 9999
US.47	PLC input value 17	47471	0h1D2F	-9999 to 9999	-9999 to 9999
US.48	PLC input value 18	47472	0h1D30	-9999 to 9999	-9999 to 9999
US.49	PLC input value 19	47473	0h1D31	-9999 to 9999	-9999 to 9999

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
US.50	PLC input value 20	47475	0h1D32	-9999 to 9999	-9999 to 9999
US.51	PLC input value 21	47475	0h1D33	-9999 to 9999	-9999 to 9999
US.52	PLC input value 22	47476	0h1D34	-9999 to 9999	-9999 to 9999
US.53	PLC input value 23	47477	0h1D35	-9999 to 9999	-9999 to 9999
US.54	PLC input value 24	47478	0h1D36	-9999 to 9999	-9999 to 9999
US.55	PLC input value 25	47479	0h1D37	-9999 to 9999	-9999 to 9999
US.56	PLC input value 26	47480	0h1D38	-9999 to 9999	-9999 to 9999
US.57	PLC input value 27	47481	0h1D39	-9999 to 9999	-9999 to 9999
US.58	PLC input value 28	47482	0h1D3A	-9999 to 9999	-9999 to 9999
US.59	PLC input value 29	47483	0h1D3B	-9999 to 9999	-9999 to 9999
US.60	PLC input value 30	47484	0h1D3C	-9999 to 9999	-9999 to 9999
US.80	Analogue input V1 value	47504	0h1D50	0 to 12.000%	0 to 12000
US.81	Analogue input I2 value	47505	0h1D51	-12.000 to 12.000%	-12000 to 12000
US.82	Digital inputs value	47506	0h1D52	0 to 127	0 to 127
US.85	Analogue output value	47509	0h1D55	0.000 to 10.000%	0 to 10000
US.88	Digital output value	47512	0h1D58	0 to 3	0 to 3

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
UF.1	PLC function 1	47681	0h1E01	NOP	
				ADD	0
				SUB	1
				ADDSUB	2
				MIN	3
				MAX	4
				ABS	5
				NEGATE	6
				MPYDIV	7
				REMAINDER	8
				COMPARE-GT	9
				COMPARE-GEQ	10
				COMPARE-EQUAL	11
				COMPARE-NEQUAL	12
				TIMER	13
				LIMIT	14
				AND	15
				OR	16
				XOR	17
				ANDOR	18
				SWITCH	19
				BITTEST	20
				BITSET	21
				BITCLEAR	22
				LOWPASSFILTER	23
				PI_CONTORL	24
				PI_PROCESS	25
				UPCOUNT	26
				DOWNCOUNT	27
UF.2	Input A for PLC function 1	47682	0h1E02	0 to 65535	0 to 65535
UF.3	Input B for PLC function 1	47683	0h1E03	0 to 65535	0 to 65535
UF.4	Input C for PLC function 1	47684	0h1E04	0 to 65535	0 to 65535
UF.5	Output PLC function 1	47685	0h1E05	-32767 to 32767	-32767 to 32767
UF.6	PLC function 2	47686	0h1E06	See UF.1	See UF.1

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
UF.7	Input A for PLC function 2	47687	0h1E07	See UF.2	See UF.2
UF.8	Input B for PLC function 2	47688	0h1E08	See UF.3	See UF.3
UF.9	Input C for PLC function 2	47689	0h1E09	See UF.4	See UF.4
UF.10	Output PLC function 2	47690	0h1E0A	See UF.5	See UF.5
UF.11	PLC function 3	47691	0h1E0B	See UF.1	See UF.1
UF.12	Input A for PLC function 3	47692	0h1E0C	See UF.2	See UF.2
UF.13	Input B for PLC function 3	47693	0h1E0D	See UF.3	See UF.3
UF.14	Input C for PLC function 3	47694	0h1E0E	See UF.4	See UF.4
UF.15	Output PLC function 3	47695	0h1E0F	See UF.5	See UF.5
UF.16	PLC function 4	47696	0h1E10	See UF.1	See UF.1
UF.17	Input A for PLC function 4	47697	0h1E11	See UF.2	See UF.2
UF.18	Input B for PLC function 4	47698	0h1E12	See UF.3	See UF.3
UF.19	Input C for PLC function 4	47699	0h1E13	See UF.4	See UF.4
UF.20	Output PLC function 4	47700	0h1E14	See UF.5	See UF.5
UF.21	PLC function 5	47701	0h1E15	See UF.1	See UF.1
UF.22	Input A for PLC function 5	47702	0h1E16	See UF.2	See UF.2
UF.23	Input B for PLC function 5	47703	0h1E17	See UF.3	See UF.3
UF.24	Input C for PLC function 5	47704	0h1E18	See UF.4	See UF.4
UF.25	Output PLC function 5	47705	0h1E19	See UF.5	See UF.5
UF.26	PLC function 6	47706	0h1E1A	See UF.1	See UF.1
UF.27	Input A for PLC function 6	47707	0h1E1B	See UF.2	See UF.2

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
UF.28	Input B for PLC function 6	47708	0h1E1C	See UF.3	See UF.3
UF.29	Input C for PLC function 6	47709	0h1E1D	See UF.4	See UF.4
UF.30	Output PLC function 6	47710	0h1E1E	See UF.5	See UF.5
UF.31	PLC function 7	47711	0h1E1F	See UF.1	See UF.1
UF.32	Input A for PLC function 7	47712	0h1E20	See UF.2	See UF.2
UF.33	Input B for PLC function 7	47713	0h1E21	See UF.3	See UF.3
UF.34	Input C for PLC function 7	47714	0h1E22	See UF.4	See UF.4
UF.35	Output PLC function 7	47715	0h1E23	See UF.5	See UF.5
UF.36	PLC function 8	47716	0h1E24	See UF.1	See UF.1
UF.37	Input A for PLC function 8	47717	0h1E25	See UF.2	See UF.2
UF.38	Input B for PLC function 8	47718	0h1E26	See UF.3	See UF.3
UF.39	Input C for PLC function 8	47719	0h1E27	See UF.4	See UF.4
UF.40	Output PLC function 8	47720	0h1E28	See UF.5	See UF.5
UF.41	PLC function 9	47721	0h1E29	See UF.1	See UF.1
UF.42	Input A for PLC function 9	47722	0h1E2A	See UF.2	See UF.2
UF.43	Input B for PLC function 9	47723	0h1E2B	See UF.3	See UF.3
UF.44	Input C for PLC function 9	47724	0h1E2C	See UF.4	See UF.4
UF.45	Output PLC function 9	47725	0h1E2D	See UF.5	See UF.5
UF.46	PLC function 10	47726	0h1E2E	See UF.1	See UF.1
UF.47	Input A PLC function 10	47727	0h1E2F	See UF.2	See UF.2
UF.48	Input B PLC function 10	47728	0h1E30	See UF.3	See UF.3

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
UF.49	Input C PLC function 10	47729	0h1E31	See UF.4	See UF.4
UF.50	Output PLC function 10	47730	0h1E32	See UF.5	See UF.5
UF.51	PLC function 11	47731	0h1E33	See UF.1	See UF.1
UF.52	Input A PLC function 11	47732	0h1E34	See UF.2	See UF.2
UF.53	Input B PLC function 11	47733	0h1E35	See UF.3	See UF.3
UF.54	Input C PLC function 11	47734	0h1E36	See UF.4	See UF.4
UF.55	Output PLC function 11	47735	0h1E37	See UF.5	See UF.5
UF.56	PLC function 12	47736	0h1E38	See UF.1	See UF.1
UF.57	Input A PLC function 12	47737	0h1E39	See UF.2	See UF.2
UF.58	Input B PLC function 12	47738	0h1E3A	See UF.3	See UF.3
UF.59	Input C PLC function 12	47739	0h1E3B	See UF.4	See UF.4
UF.60	Output PLC function 12	47740	0h1E3C	See UF.5	See UF.5
UF.61	PLC function 13	47741	0h1E3D	See UF.1	See UF.1
UF.62	Input A PLC function 13	47742	0h1E3E	See UF.2	See UF.2
UF.63	Input B PLC function 13	47743	0h1E3F	See UF.3	See UF.3
UF.64	Input C PLC function 13	47744	0h1E40	See UF.4	See UF.4
UF.65	Output PLC function 13	47745	0h1E41	See UF.5	See UF.5
UF.66	PLC function 14	47746	0h1E42	See UF.1	See UF.1
UF.67	Input A PLC function 14	47747	0h1E43	See UF.2	See UF.2
UF.68	Input B PLC function 14	47748	0h1E44	See UF.3	See UF.3
UF.69	Input C PLC function 14	47749	0h1E45	See UF.4	See UF.4

Screen	Description	Modbus Decimal	Address Hexadecimal	Range	Modbus Range
UF.70	Output PLC function 14	47750	0h1E46	See UF.5	See UF.5
UF.71	PLC function 15	47751	0h1E47	See UF.1	See UF.1
UF.72	Input A PLC function 15	47752	0h1E48	See UF.2	See UF.2
UF.73	Input B PLC function 15	47753	0h1E49	See UF.3	See UF.3
UF.74	Input C PLC function 15	47754	0h1E4A	See UF.4	See UF.4
UF.75	Output PLC function 15	47755	0h1E4B	See UF.5	See UF.5
UF.76	PLC function 16	47756	0h1E4C	See UF.1	See UF.1
UF.77	Input A PLC function 16	47757	0h1E4D	See UF.2	See UF.2
UF.78	Input B PLC function 16	47758	0h1E4E	See UF.3	See UF.3
UF.79	Input C PLC function 16	47759	0h1E4F	See UF.4	See UF.4
UF.80	Output PLC function 16	47760	0h1E50	See UF.5	See UF.5
UF.81	PLC function 17	47761	0h1E51	See UF.1	See UF.1
UF.82	Input A PLC function 17	47762	0h1E52	See UF.2	See UF.2
UF.83	Input B PLC function 17	47763	0h1E53	See UF.3	See UF.3
UF.84	Input C PLC function 17	47764	0h1E54	See UF.4	See UF.4
UF.85	Output PLC function 17	47765	0h1E55	See UF.5	See UF.5
UF.86	PLC function 18	47766	0h1E56	See UF.1	See UF.1
UF.87	Input A PLC function 18	47767	0h1E57	See UF.2	See UF.2
UF.88	Input B PLC function 18	47768	0h1E58	See UF.3	See UF.3
UF.89	Input C PLC function 18	47769	0h1E59	See UF.4	See UF.4
UF.90	Output PLC function 18	47770	0h1E5A	See UF.5	See UF.5

ACCESSORIES

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CODE(★)	TYPE	DESCRIPTION
See section "Communications"	Communications	<p>SD300 family is compatible with the most commonly used communication protocols (Profibus-DP, Modbus TCP, Ethernet IP, CANOpen...), thanks to its optional boards.</p> <p>Please refer to section "Communications" when purchasing additional communication boards.</p>
SD3IO	Extension I/O	<p>Expansion module I/O: 3 Digital Inputs, 2 Digital Outputs, 2 Analog Inputs and 1 Analog Output.</p> <p>Please refer to section "Extension I/O" for further information.</p>
SD3EBF□	Conduit Kit	<p>UL open type and enclosed type 1 certification:</p> <ul style="list-style-type: none"> • UL open type is offered by default. • UL enclosed type1 needs conduit kit (option) installation. <p>Ask for the Conduit Module that corresponds to your drive frame for NEMA1 compliance. Please refer to section "Conduit Kit" for further information.</p>
SD3FLGF□	Flange type	<p>The heat sink can be mounted outside of the panel in case the space is limited.</p> <p>Ask for the flange that corresponds to your drive frame. More information about this item can be found in section "Flange Type".</p>
SD3CF1	Display extender	Display extender kit 3 meters.

CODE(*)	TYPE	DESCRIPTION
SD3DSP	Optional display	Removable LCD display unit for remote installation. It integrates three LEDs that show the drive status, a LCD screen with 4 lines of 16 characters and a control keyboard for parameters setting and commissioning. For further information, contact Power Electronics.

(*) Consult availability with Power Electronics.

Communications

SD300 family is compatible with the most commonly used communication protocols (Profibus-DP, Modbus TCP, Ethernet IP, CANOpen...), thanks to its optional boards.

Please refer to the table below when purchasing additional communication boards:

Code	Frame
SD3CO	CANOpen communication module
SD3PB	Profibus-DP communication module.
SD3ETH	Ethernet I/P – Modbus TCP communication module.
SD3ETC	EtherCAT communication module.
SD3PN	Profinet communication module.

Extension I/O

The input and output expansion optional board offers the possibility to increase the number of analogue and digital inputs and outputs for the inverters of the SD300 series.

This board includes:

- 3 Digital Inputs and 2 Digital Outputs.
- 2 Analogue Inputs and 1 Analogue Output.

For further details and installation instructions, please refer to *the I/O Expansion Board Manual*.

Conduit Kit

UL open type is offered by default. To meet UL enclosed type1, this kit must be installed.



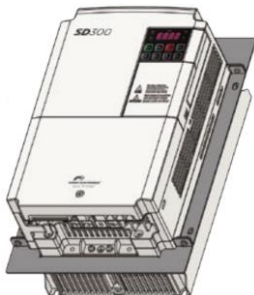
Optional conduit kit

Ask for the conduit module that corresponds to your drive frame for NEMA1 compliance:

Code	Frame
SD3EBF1	1N & 2N
SD3EBF2	3N & 4N
SD3EBF3	5N
SD3EBIP6F1	1F
SD3EBIP6F2	2F
SD3EBIP6F3	3F
SD3EBF4	4
SD3EBF5	5
SD3EBF6	6

Flange Type

The flange type can be mounted outside of the panel in case the space is limited. Its main purpose is to favor the dissipation of the generated heat during operations, working as a heat sink.



Optional flange type

Ask for the flange that corresponds to your drive frame:

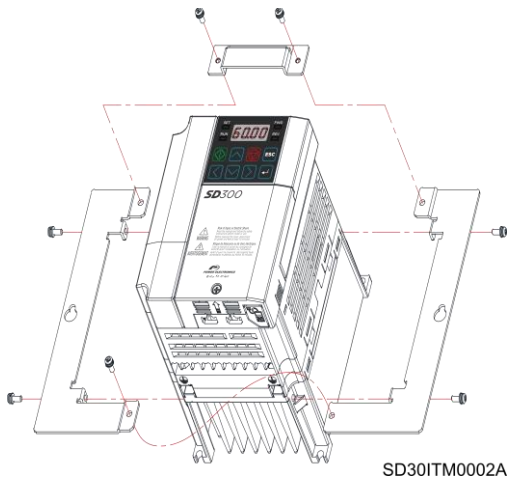
Code	Frame
SD3FLGF1	1N & 2N
SD3FLGF2	3N & 4N
SD3FLGF3	5N
SD3FLGIP6F1	1F
SD3FLGIP6F2	2F
SD3FLGIP6F3	3F
SD3FLGF4	4
SD3FLGF5	5
SD3FLGF6	6

Mechanical Installation

Frames 1N, 2N, 3N, 1F, 2F & 3F:

In order to install the Flange Option:

- Fasten both sides of the flange to the base of the drive using the included M3 bolts with a tightening torque between 2.1 and 6.1 (kgf*cm).
- Use the remaining bolts to fix the flange as shown below.

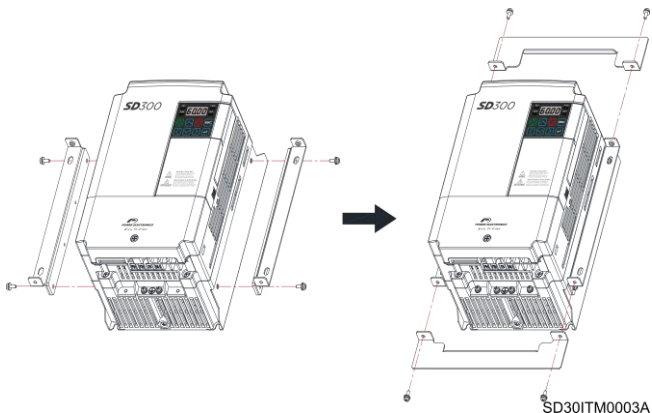


Frames N and F flange option kit mounting.

Frames 4, 5 & 6:

In order to install the Flange Option:

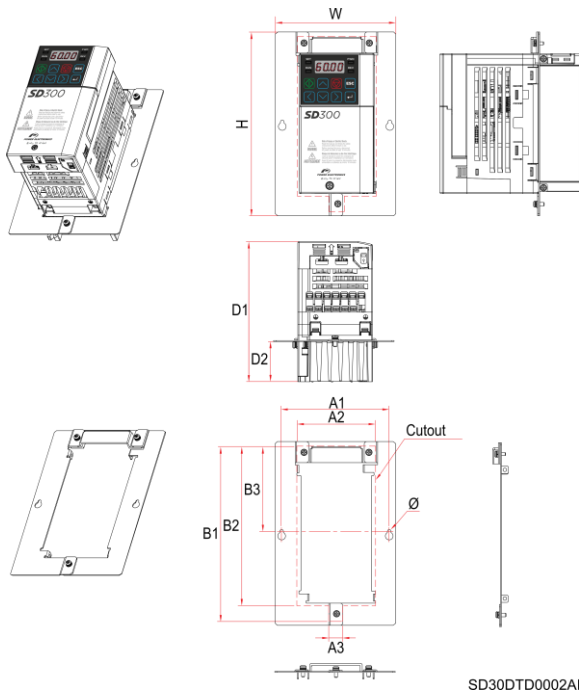
- Fasten both sides of the flange to the base of the drive using the included M4 bolts with a tightening torque between 0.2 and 0.6 (Nm) and M5 bolts with a tightening torque between 0.4 and 1 (Nm).
- Use the remaining bolts to fix the flange as shown below.



Frames 4, 5 and 6 flange option kit mounting

Dimensions

Frame 1N:

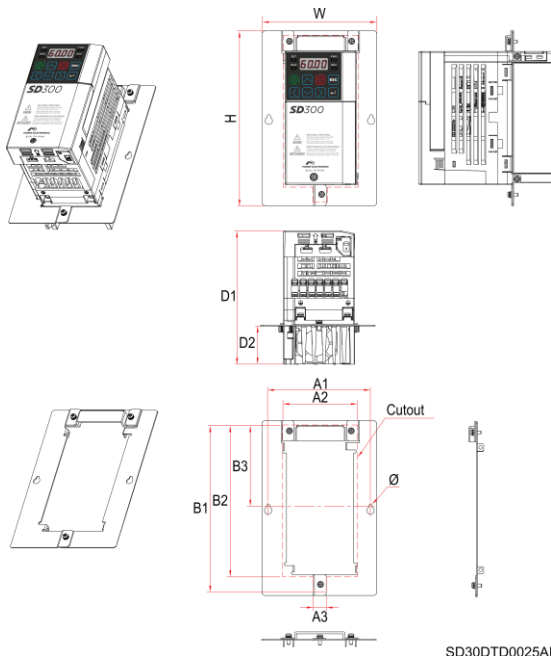


Frame 1N flange option kit dimensions

Model	W	H	D1	D2	A1	A2	A3	B1	B2	B3	Ø	Weight*
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	kg (lb)
SD300322	110	168	123	31.8	98	72	14	159.8	145.4	77.9	3.5	1.1
SD300242	(4.33)	(6.61)	(4.84)	(1.25)	(3.86)	(2.83)	(0.55)	(6.29)	(5.72)	(3.07)	(0.14)	(2.43)

*Total weight of the drive with the flange installed

Frame 2N:

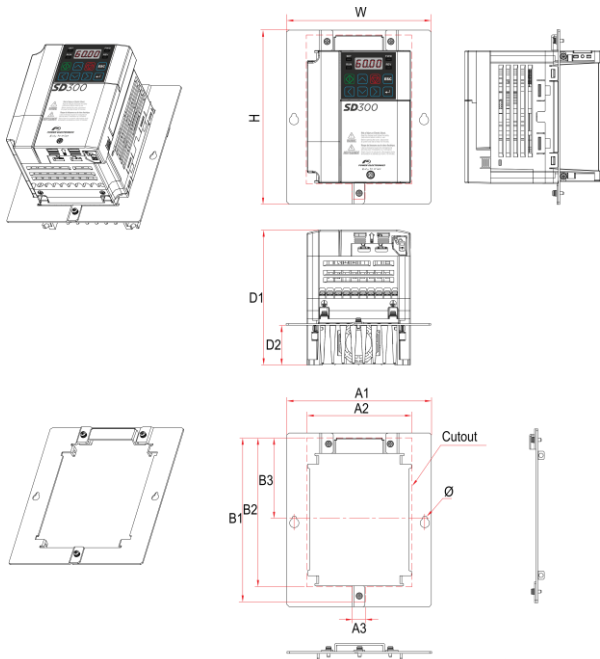


Frame 2N flange option kit dimensions

Model	W	H	D1	D2	A1	A2	A3	B1	B2	B3	Ø	Weight*
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	kg (lb)
SD300312	110	168	128	36.8	98	72	14	159.8	145.4	77.9	3.5	1.1
SD300622	(4.33)	(6.61)	(5.04)	(1.45)	(3.86)	(2.83)	(0.55)	(6.29)	(5.72)	(3.07)	(0.14)	(2.43)
SD300342												

*Total weight of the drive with the flange installed

Frames 3N & 4N:



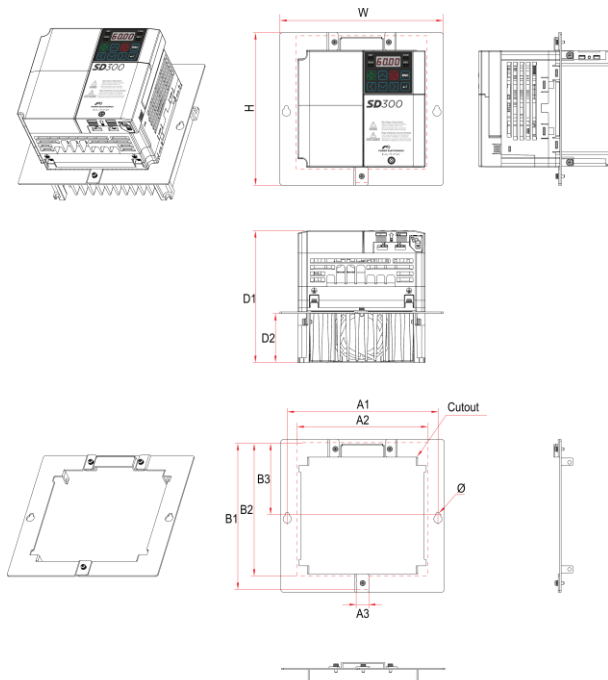
SD30DTD0003AI

Frames 3N & 4N flange option kit dimensions

Model	W	H	D1	D2	A1	A2	A3	B1	B2	B3	Ø	Weight*
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	kg (lb)
SD300612	140	168	130	38.2	140	102	14	159.8	144.4	77.9	4.5	1.6
SD300922	(5.51)	(6.61)	(5.12)	(1.50)	(5.51)	(4.02)	(0.55)	(6.29)	(5.69)	(3.07)	(0.18)	(3.53)
SD300542												
SD300912	140	168	145	53.2	140	102	14	159.8	144.4	77.9	4.5	1.8
SD301222	(5.51)	(6.61)	(5.71)	(2.09)	(5.51)	(4.02)	(0.55)	(6.29)	(5.69)	(3.07)	(0.18)	(3.97)
SD300742												

*Total weight of the drive with the flange installed

Frame 5N:



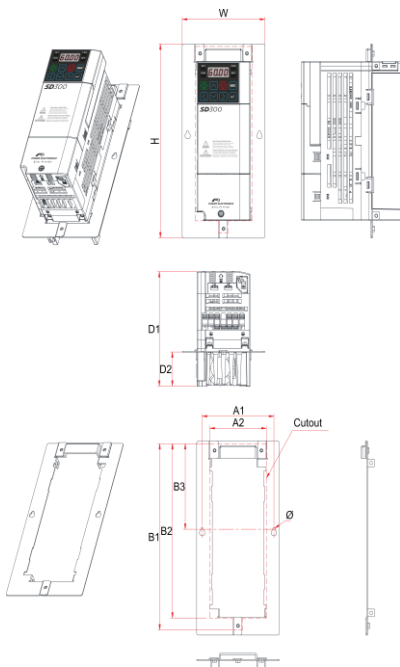
SD30DTD0004AI

Frame 5N flange option kit dimensions.

Model	W	H	D1	D2	A1	A2	A3	B1	B2	B3	Ø	Weight*
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	kg (lb)
SD301212	179.8	168	145	54	165.8	144	14	161.4	146.4	78.9	4.5	2.3
SD301822	(7.08)	(6.61)	(5.71)	(2.13)	(6.53)	(5.67)	(0.55)	(6.35)	(5.76)	(3.11)	(0.18)	(5.07)
SD301042												

*Total weight of the drive with the flange installed

Frame 1F:



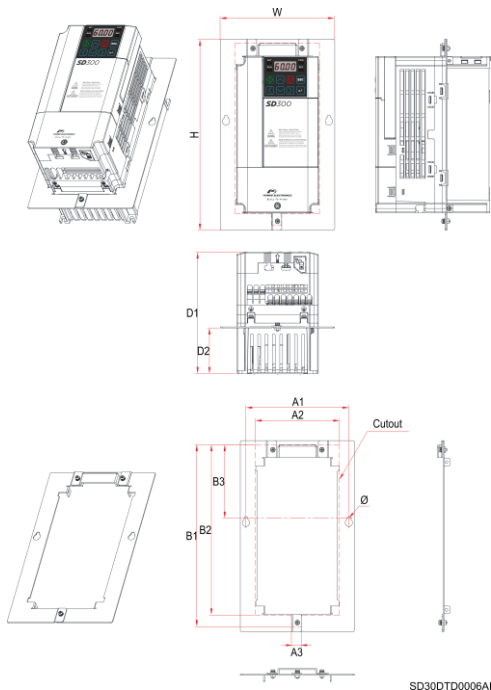
SD30DTD0005AI

Frame 1F flange option kit dimensions.

Model	W	H	D1	D2	A1	A2	B1	B2	B3	Ø	Weight*
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	kg (lb)
SD300242F	106	220	130	38.8	92	72.5	211.4	197.8	97.1	3.5	1.5 (3.3)
SD300312F	(4.17)	(8.66)	(5.12)	(1.53)	(3.62)	(2.85)	(8.32)	(7.79)	(3.82)	(0.14)	
SD300342F											

*Total weight of the drive with the flange installed

Frame 2F:

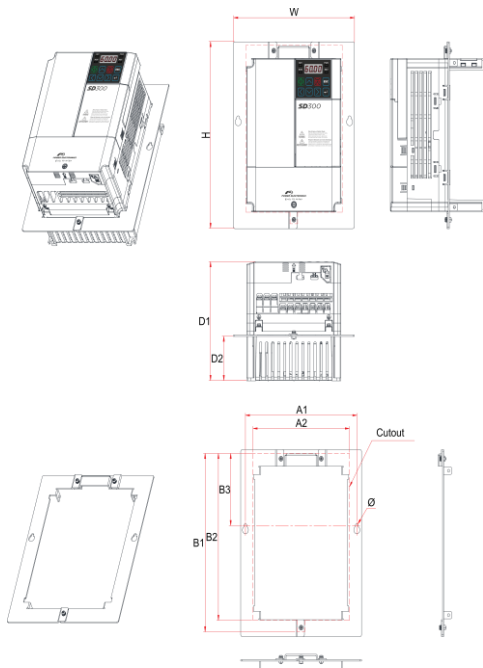


Frame 2F flange option kit dimensions.

Model	W	H	D1	D2	A1	A2	B1	B2	B3	Ø	Weight*
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	kg (lb)
SD300612F											
SD300912F	140	220	140	52.6	126	103.1	209.6	196.2	84.9	4.5	2.2
SD300542F	(5.51)	(8.66)	(5.51)	(2.07)	(4.96)	(4.06)	(8.25)	(7.72)	(3.34)	(0.18)	(4.85)
SD300742F											

*Total weight of the drive with the flange installed

Frame 3F:



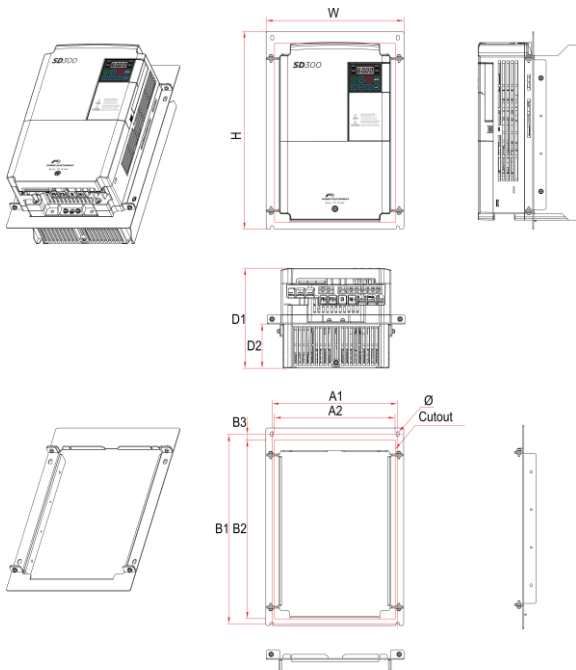
SD30DTD0007AI

Frame 3F flange option kit dimensions.

Model	W	H	D1	D2	A1	A2	B1	B2	B3	Ø	Weight*
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	kg (lb)
SD301042F	180	220	140	52.2	166	143.3	210.1	196.7	85.1	4.5	2.3
SD301212F	(7.09)	(8.66)	(5.51)	(2.06)	(6.54)	(5.64)	(8.27)	(7.74)	(3.35)	(0.18)	(5.07)

*Total weight of the drive with the flange installed

Frames 4, 5 & 6:



SD300TD0008AI

Frames 4, 5 & 6 flange option kit dimensions

Model	W	H	D1	D2	A1	A2	B1	B2	B3	Ø	Weight*
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	kg (lb)
SD303022, SD304022	206	264.5	140	55.1	186	178	251.5	235	8.4	5	3.7
SD301642F, SD302342F	(8.11)	(10.41)	(5.51)	(2.17)	(7.32)	(7.01)	(9.90)	(9.25)	(0.33)	(0.20)	(8.16)

Model	W	H	D1	D2	A1	A2	B1	B2	B3	Ø	Weight*
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	kg (lb)
SD305622, SD303042F SD303842F	225.2 (8.87)	322.7 (12.71)	163 (6.42)	72.1 (2.84)	205.2 (8.09)	197.5 (7.78)	309.7 (12.19)	292.5 (11.52)	9.3 (0.37)	5 (0.20)	5.15 (11.35)
SD306922, SD304442F SD305842F	267 (10.51)	384.5 (15.14)	187 (7.36)	93.6 (3.69)	247 (9.72)	239 (9.41)	371.5 (14.63)	352 (13.86)	9.5 (0.37)	6 (0.24)	5.4 (11.91)

*Total weight of the drive with the flange installed

Drive + Flange Mounting

The SD300 variable speed drives are designed to be mounted on a wall or inside a panel.

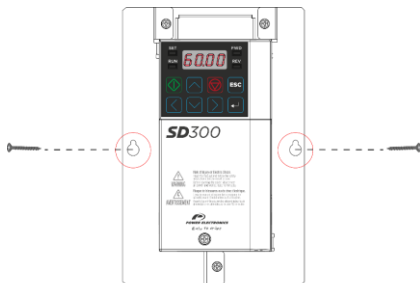
The inverter can become very hot during operation. Install the inverter on a surface that is fire-resistant or flame-retardant and with sufficient clearance around the inverter to allow air to circulate.

Make sure to follow the mounting and clearance recommendations in sections Drive Mounting and Clearances respectively.

The number of required screws for fixing the drive + flange varies depending the frame and is shown in the table below. Please refer to section "DIMENSIONS" to verify the frame and exact measures of your SD300 drive.

Frame	Fixing screws (number * metric)
1N, 2N, 1F	2*M3
3N, 4N, 5N, 2F, 3F	2*M4
4, 5	4*M4
6	4*M5

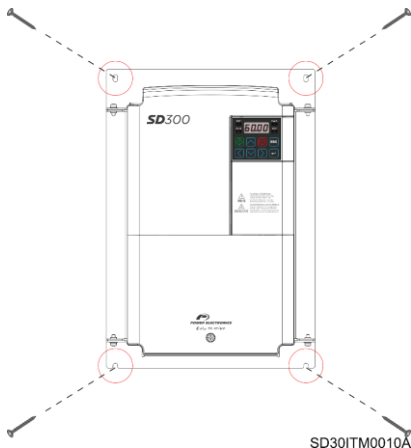
Example: Frame 1N drive + flange mounting: Use two M3 screws to fix the drive to the wall/cabinet.



SD30ITM0004A

Drive + flange mounting. Frame 1N.

Example: Frame 5 drive + flange mounting: Use four M4 screws to fix the drive to the wall/cabinet.



SD30ITM0010A

Drive + flange mounting. Frame 5

COMMONLY USED CONFIGURATIONS

17



NOTICE

The following instructions are based on the assumption that all parameters are set to the factory default values. Results may be different if parameter values have been modified. In this case, set all parameters back to their default value and follow the instructions.

Start/Stop command and speed setting from keyboard

Parameter configuration

Parameter	Default value	Description	Set value
0.00	0.00Hz	Frequency reference	x.xxHz (Set the frequency reference).
ACC	20.0 seg	Acceleration time	10.0 sec
dEC	30.0 seg	Deceleration time	10.0 sec
drv	1	Start/Stop control	0: Start/Stop from keyboard.
frq	0	Frequency setting mode	0: Reference will be introduced from keyboard.
Ad.8	0	Stop mode	0: Stop with deceleration ramp. 1: DC brake to stop. 2: Free run to stop. 4: Regenerative brake to stop.
Ad.10	0	Start after low voltage.	0: NO (Drive does not start after power loss). 1: YES (Drive starts after power loss).
Ad.24	0	Use frequency limit	0: NO (Limits are set by maximum frequency and start frequency). 1: YES (Limits are set by the higher and lower frequency limits).
Ad.25	0.50Hz	Frequency lower limit	0.00Hz

Parameter	Default value	Description	Set value								
Ad.26	50.00Hz	Frequency higher limit	50.00Hz								
bA.13	(*)	Motor Current	?A (See motor plate).								
dr.14	(*)	Motor rated power	<table><tr><td>0.2</td><td>0.2kW</td></tr><tr><td>...</td><td>...</td></tr><tr><td>5.5</td><td>5.5kW</td></tr><tr><td>7.5</td><td>7.5kW</td></tr></table>	0.2	0.2kW	5.5	5.5kW	7.5	7.5kW
0.2	0.2kW										
...	...										
5.5	5.5kW										
7.5	7.5kW										
dr.15	0	Torque boost	0: Manual torque (Both directions can be configured separately, in dr.16 → 'Start torque in forward direction' and in dr.17 → 'Start torque in reverse direction'). 1 and 2: The drive automatically calculates the voltage to apply at the start using the motor parameters.								
dr.18	60.00Hz	Motor frequency	50.00Hz								
dr.19	0.50Hz	Start frequency	0.10Hz								
dr.20	60.00Hz	Max speed limit	50.00Hz								
dr.93	0	Parameter initialization	1: Set parameters back to their factory value (only if required)								
dr.97	2.x	Software version	-								
Cn.4	3kHz	Modulation frequency	5kHz								

(*) This value depends on the motor setting.

Start/Stop command by keyboard and speed setting by analogue input

Parameter configuration

Parameter	Default value	Description	Set value								
0.00	0.00Hz	Frequency reference	x.xxHz (Reference visualization).								
ACC	20.0 seg	Acceleration time	10.0 sec								
dEC	30.0 seg	Deceleration time	10.0 sec								
drv	1	Start/Stop control	0: Start/Stop from keyboard.								
frq	0	Frequency setting mode	2: Reference will be introduced through analogue V1. 5: Reference will be introduced through analogue I2.								
Ad.8	0	Stop mode	0: Stop with deceleration ramp. 1: DC brake to stop. 2: Free run to stop. 4: Regenerative brake to stop.								
Ad.10	0	Start after low voltage.	0: NO (Drive does not start after power loss). 1: YES (Drive starts after power loss).								
Ad.24	0	Use frequency limit	0: NO (Limits are set by maximum frequency and start frequency). 1: YES (Limits are set by the higher and lower frequency limits).								
Ad.25	0.50Hz	Frequency lower limit	0.00Hz								
Ad.26	50.00Hz	Frequency higher limit	50.00Hz								
ba.13	(*)	Motor Current	?A (See motor plate).								
dr.14	(*)	Motor rated power	<table><tr><td>0.2</td><td>0.2kW</td></tr><tr><td>...</td><td>...</td></tr><tr><td>5.5</td><td>5.5kW</td></tr><tr><td>7.5</td><td>7.5kW</td></tr></table>	0.2	0.2kW	5.5	5.5kW	7.5	7.5kW
0.2	0.2kW										
...	...										
5.5	5.5kW										
7.5	7.5kW										

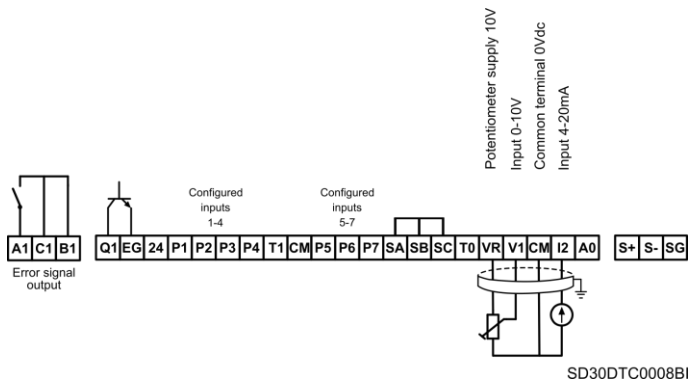
(*) This value depends on the motor setting.

Parameter	Default value	Description	Set value
dr.15	0	Torque boost	0: Manual torque (Both directions can be configured separately, in dr.16 → 'Start torque in forward direction' and in dr.17 → 'Start torque in reverse direction'). 1 and 2: The drive automatically calculates the voltage to apply at the start using the motor parameters.
dr.18	60.00Hz	Motor frequency	50.00Hz
dr.19	0.50Hz	Start frequency	0.10Hz
dr.20	60.00Hz	Max speed limit	50.00Hz
dr.93	0	Parameter initialization	1: Set parameters back to their factory value (only if required).
dr.97	2.x	Software version	-
Cn.4	3kHz	Modulation frequency	5kHz
In.1	50.00Hz	Analog input max. freq	50.00Hz
In.7	10	V1 filter	10ms (Low Pass Filter for V1).
In.8	0V	V1 minimum voltage	0.00V (V1 minimum voltage adjustment).
In.9	0.00	V1 minimum reference	0.00 (% of the value set in In.1)
In.10	10V	V1 maximum voltage	10.0V (V1 maximum voltage adjustment).
In.11	100.00	V1 maximum reference	100.00 (% of the value set in In.1)
In.52	10ms	I2 filter	10ms (Analogue input current filter).
In.53	4.00mA	I2 minimum current	4.00mA (I2 minimum current adjustment).
In.54	0.00	I2 minimum reference	0.00 (% of the value set In.1)
In.55	20.00mA	I2 maximum current	20.00mA (I2 maximum current adjustment)
In.56	100.00	I2 maximum reference	100.00 (% of the value set In.1)

Connection scheme

Terminals I2/CM: Analogue input 4 – 20mA.

Terminals VR/V1/CM: Analogue input 0 – 10V.



Start/Stop command by keyboard and speed setting by analogue input

Start/Stop command by terminals and speed setting by analogue input

Parameter configuration

Parameter	Default value	Description	Set value								
0.00	0.00Hz	Frequency reference	x.xxHz (Reference visualization).								
ACC	20.0 seg	Acceleration time	10.0 sec								
dEC	30.0 seg	Deceleration time	10.0 sec								
drv	1	Start/Stop control	1: Start/Stop from terminals FX – Forward o Rx – Reverse.								
frq	0	Frequency setting mode	2: Reference will be introduced through analogue V1. 5: Reference will be introduced through analogue I2.								
Ad.8	0	Stop mode	0: Stop with deceleration ramp. 1: DC brake to stop. 2: Free run to stop. 4: Regenerative brake to stop.								
Ad.10	0	Start after low voltage.	0: NO (Drive does not start after power loss). 1: YES (Drive starts after power loss).								
Ad.24	0	Use frequency limit	0: NO (Limits are set by maximum frequency and start frequency). 1: YES (Limits are set by the higher and lower frequency limits).								
Ad.25	0.50Hz	Frequency lower limit	0.00Hz								
Ad.26	50.00Hz	Frequency higher limit	50.00Hz								
bA.13	(*)	Motor Current	?A (See motor plate).								
dr.14	(*)	Motor rated power	<table><tr><td>0.2</td><td>0.2kW</td></tr><tr><td>...</td><td>...</td></tr><tr><td>5.5</td><td>5.5kW</td></tr><tr><td>7.5</td><td>7.5kW</td></tr></table>	0.2	0.2kW	5.5	5.5kW	7.5	7.5kW
0.2	0.2kW										
...	...										
5.5	5.5kW										
7.5	7.5kW										

(*) This value depends on the motor setting.

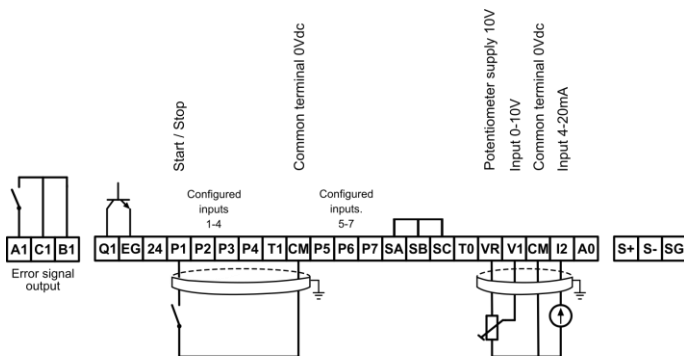
Parameter	Default value	Description	Set value
dr.15	0	Torque boost	0: Manual torque (Both directions can be configured separately, in dr.16 → 'Start torque in forward direction' and in dr.17 → 'Start torque in reverse direction'). 1 and 2: The drive automatically calculates the voltage to apply at the start using the motor parameters.
dr.18	60.00Hz	Motor frequency	50.00Hz
dr.19	0.50Hz	Start frequency	0.10Hz
dr.20	60.00Hz	Max speed limit	50.00Hz
dr.93	0	Parameter initialization	1: Set parameters back to their factory value (only if required).
dr.97	2.x	Software version	-
Cn.4	3kHz	Modulation frequency	5kHz
In.1	50.00Hz	Analog input max. freq	50.00Hz
In.7	10	V1 filter	10ms (Low Pass Filter for V1).
In.8	0V	V1 minimum voltage	0.00V (V1 minimum voltage adjustment).
In.9	0.00	V1 minimum reference	0.00 (% of the value set in In.1)
In.10	10V	V1 maximum voltage	10.0V (V1 maximum voltage adjustment).
In.11	100.00	V1 maximum reference	100.00 (% of the value set in In.1)
In.52	10ms	I2 filter	10ms (Analogue input current filter).
In.53	4.00mA	I2 minimum current	4.00mA (I2 minimum current adjustment).
In.54	0.00	I2 minimum reference	0.00 (% of the value set In.1)
In.55	20.00mA	I2 maximum current	20.00mA (I2 maximum current adjustment)
In.56	100.00	I2 maximum reference	100.00 (% of the value set In.1)
In.65	1	Digital input 1	1: Forward start command

Connection scheme

Terminals CM/P1: Start commando (NO state).

Terminals I2/CM: Analogue input 4 – 20mA.

Terminals VR/V1/CM: Analogue input 0 – 10V.



SD30DTC0007BI

Start/Stop command by terminals and speed setting by analogue input

Multi-speed commands (multi-step frequencies) using P5, P6 and P7

Parameter configuration

Parameter	Default value	Description	Set value								
0.00	0.00Hz	Frequency reference	x.xxHz (Reference visualization).								
ACC	20.0 seg	Acceleration time	10.0 sec								
dEC	30.0 seg	Deceleration time	10.0 sec								
drv	1	Start/Stop control	1: Start/Stop from terminals FX – Forward or Rx – Reverse.								
frq	0	Frequency setting mode	0: Reference will be introduced from keyboard.								
St1	10.00Hz	Multi-reference speed 1	30.00Hz (Multi-speed 1)								
St2	20.00Hz	Multi-reference speed 2	35.00Hz (Multi-speed 2)								
St3	30.00Hz	Multi-reference speed 3	40.00Hz (Multi-speed 3)								
Ad.8	0	Stop mode	0: Stop with deceleration ramp. 1: DC brake to stop. 2: Free run to stop. 4: Regenerative brake to stop.								
Ad.10	0	Start after low voltage.	0: NO (Drive does not start after power loss). 1: YES (Drive starts after power loss).								
Ad.24	0	Use frequency limit	0: NO (Limits are set by maximum frequency and start frequency). 1: YES (Limits are set by the higher and lower frequency limits).								
Ad.25	0.50Hz	Frequency lower limit	0.00Hz								
Ad.26	50.00Hz	Frequency higher limit	50.00Hz								
bA.13	(*)	Motor Current	?A (See motor plate).								
dr.14	(*)	Motor rated power	<table><tr><td>0.2</td><td>0.2kW</td></tr><tr><td>...</td><td>...</td></tr><tr><td>5.5</td><td>5.5kW</td></tr><tr><td>7.5</td><td>7.5kW</td></tr></table>	0.2	0.2kW	5.5	5.5kW	7.5	7.5kW
0.2	0.2kW										
...	...										
5.5	5.5kW										
7.5	7.5kW										

(*) This value depends on the motor setting.

Parameter	Default value	Description	Set value
dr.15	0	Torque boost	0: Manual torque (Both directions can be configured separately, in dr.16 → 'Start torque in forward direction' and in dr.17 → 'Start torque in reverse direction'). 1 and 2: The drive automatically calculates the voltage to apply at the start using the motor parameters.
dr.18	60.00Hz	Motor frequency	50.00Hz
dr.19	0.50Hz	Start frequency	0.10Hz
dr.20	60.00Hz	Max speed limit	50.00Hz
dr.93	0	Parameter initialization	1: Set parameters back to their factory value (only if required)
dr.97	2.x	Software version	-
Cn.4	3kHz	Modulation frequency	5kHz
In.65	1	Digital input 1	1: Forward start command
In.69	7	Digital input 5	7: Low Speed (Low bit).
In.70	8	Digital input 6	8: Medium Speed (Medium bit).
In.71	9	Digital input 7	9: High Speed (High bit).
bA.53	40.00Hz	Multi-Reference4	45.00Hz (multiple speed 4).
bA.54	50.00Hz	Multi-Reference5	50.00Hz (multiple speed 5).
bA.55	60.00Hz	Multi-Reference6	47.00Hz (multiple speed 6).
bA.56	60.00Hz	Multi-Reference7	42.00Hz (multiple speed 7).

Depending on the state of inputs P5, P6 y P7, the different configured frequencies can be selected:

Programmed frequency	Parameter	High speed (P7)	Medium speed (P6)	Low speed (P5)
50.00Hz	0.00	0	0	0
30.00Hz	St1	0	0	1
35.00Hz	St2	0	1	0
40.00Hz	St3	0	1	1
45.00Hz	bA.53	1	0	0
50.00Hz	bA.54	1	0	1
47.00Hz	bA.55	1	1	0
42.00Hz	bA.56	1	1	1

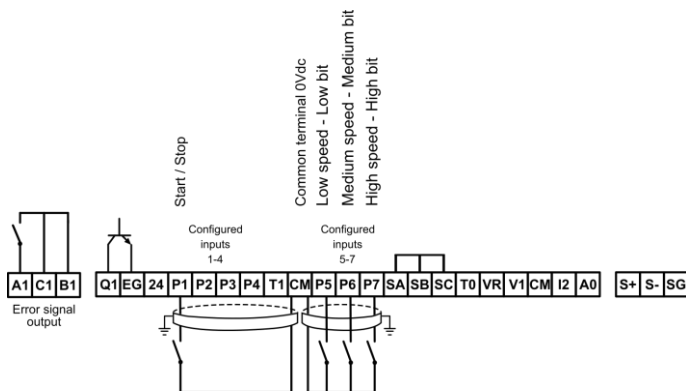
Connection scheme

Terminals CM/P1: Start command (NO state).

Terminals CM/P5: Low speed (Low bit) (NO state).

Terminals CM/P6: Medium speed (Medium bit) (NO state).

Terminals CM/P7: High speed (High bit) (NO state).



SD30DTC0009BI

Multi-speed commands (multi-step frequencies) using P5, P6 and P7

Constant pressure control and automatic stop at zero level flow.

Pressure command is set by keypad.

Parameter configuration

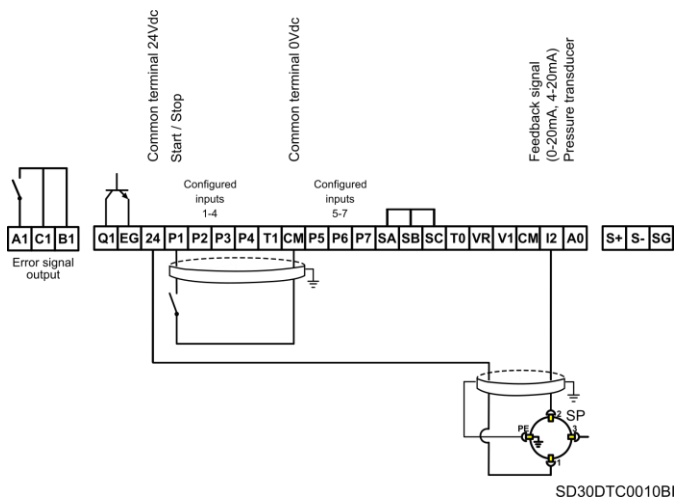
Parameter	Default value	Description	Set value								
ACC	20.0 seg	Acceleration time	10.0 sec								
dEC	30.0 seg	Deceleration time	10.0 sec								
drv	1	Start/Stop control	1: Start/Stop from terminals FX – Forward o Rx – Reverse.								
frq	0	Frequency setting mode	0: Reference will be set by keyboard								
Ad.8	0	Stop mode	0: Stop with deceleration ramp. 1: DC brake to stop. 2: Free run to stop. 4: Regenerative brake to stop.								
Ad.10	0	Start after low voltage.	0: NO (Drive does not start after power loss). 1: YES (Drive starts after power loss).								
Ad.24	0	Use frequency limit	0: NO (Limits are set by maximum frequency and start frequency). 1: YES (Limits are set by the higher and lower frequency limits).								
Ad.25	0.50Hz	Frequency lower limit	0.00Hz								
Ad.26	50.00Hz	Frequency higher limit	50.00Hz								
bA.13	(*)	Motor Current	?A (See motor plate).								
dr.14	(*)	Motor rated power	<table><tr><td>0.2</td><td>0.2kW</td></tr><tr><td>...</td><td>...</td></tr><tr><td>5.5</td><td>5.5kW</td></tr><tr><td>7.5</td><td>7.5kW</td></tr></table>	0.2	0.2kW	5.5	5.5kW	7.5	7.5kW
0.2	0.2kW										
...	...										
5.5	5.5kW										
7.5	7.5kW										
dr.18	60.00Hz	Motor frequency	50.00Hz								
dr.19	0.50Hz	Start frequency	0.10Hz								
dr.20	60.00Hz	Max speed limit	50.00Hz								
dr.93	0	Parameter initialization	1: Set parameters back to their factory value (only if required).								

(*) This value depends on the motor setting.

Parameter	Default value	Description	Set value
dr.97	2.x	Software version	-
Cn.4	3kHz	Modulation frequency	5kHz
AP.1	0	Application function selection	2: PID control enabled.
AP.19	50.0	PID local	40.0 (adjust desired PID in %)
AP.20	0	Select PID regulator source	0: PID set point introduced from keypad
AP.21	0	Select feedback signal source	3: I2 input (Feedback from a signal of 0 – 20mA).
AP.22	50.0	PID controller proportional gain	50.0
AP.23	10.0	PID controller integration time	10.0
AP.24	0.0	PID controller differential time	0.0
AP.28	0	PID mode	0: Process 1: Normal.
AP.29	60.00	Upper limit PID output	50.00Hz
AP.30	-60.00	Lower limit PID output	00.00Hz
AP.37	60 seg	Sleep mode activation delay	40 seg (Delay time before the drive stops).
AP.38	0.00Hz	Sleep mode activation speed	10.00Hz (Frequency to stop operating and enter in sleep mode).
AP.39	35%	Awakening level	10% (% of the feedback to start again).
In.1	50.00Hz	Analog input max. freq	50.00Hz
In.52	10ms	I2 filter	10ms (Analogue input current filter).
In.53	4.00mA	I2 minimum current	4.00mA (I2 minimum current adjustment).
In.54	0.00	I2 minimum reference	0.00 (% of the value set In.1)
In.55	20.00mA	I2 maximum current	20.00mA (I2 maximum current adjustment)
In.56	100.00	I2 maximum reference	100.00 (% of the value set In.1)
In.65	1	Digital input 1	1: Forward start command

Connection scheme

Terminals CM/P1: Start command (NO state).



Constant pressure control and automatic stop at zero level flow. Pressure command is set by keypad

Note: For two-wire pressure transducers, connect 1 to pin 24 and 2 to pin I2

Speed control (up/down potentiometer) and Start/Stop commands by terminals

Parameter configuration

Parameter	Default value	Description	Set value								
0.00	0.00Hz	Frequency reference	x.xxHz (Reference visualization).								
ACC	20.0 seg	Acceleration time	10.0 sec								
dEC	30.0 seg	Deceleration time	10.0 sec								
drv	1	Start/Stop control	1: Start/Stop from terminals FX – Forward o Rx – Reverse.								
Frq	0	Frequency setting mode	0: Local								
Ad.8	0	Stop mode	0: Stop with deceleration ramp. 1: DC brake to stop. 2: Free run to stop. 4: Regenerative brake to stop.								
Ad.10	0	Start after low voltage.	0: NO (Drive does not start after power loss). 1: YES (Drive starts after power loss).								
Ad.24	0	Use frequency limit	0: NO (Limits are set by maximum frequency and start frequency). 1: YES (Limits are set by the higher and lower frequency limits).								
Ad.25	0.50Hz	Frequency lower limit	0.00Hz								
Ad.26	50.00Hz	Frequency higher limit	50.00Hz								
bA.13	(*)	Motor Current	?A (See motor plate).								
dr.14	(*)	Motor rated power	<table><tr><td>0.2</td><td>0.2kW</td></tr><tr><td>...</td><td>...</td></tr><tr><td>5.5</td><td>5.5kW</td></tr><tr><td>7.5</td><td>7.5kW</td></tr></table>	0.2	0.2kW	5.5	5.5kW	7.5	7.5kW
0.2	0.2kW										
...	...										
5.5	5.5kW										
7.5	7.5kW										
dr.15	0	Torque boost	0: Manual torque (Both directions can be configured separately, in dr.16 → 'Start torque in forward direction' and in dr.17 → 'Start torque in reverse direction'). 1 and 2: The drive automatically calculates the voltage to apply at the start using the motor parameters.								

Parameter	Default value	Description	Set value
dr.18	60.00Hz	Motor frequency	50.00Hz
dr.19	0.50Hz	Start frequency	0.10Hz
dr.20	60.00Hz	Max speed limit	50.00Hz
dr.93	0	Parameter initialization	1: Set parameters back to their factory value (only if required).
dr.97	2.x	Software version	-
Cn.4	3kHz	Modulation frequency	5kHz
In.65	1	Digital input 1	1: Forward start command
In.70	8	Digital input 6	17: UP
In.71	9	Digital input 7	18: DOWN

(*) This value depends on the motor setting.

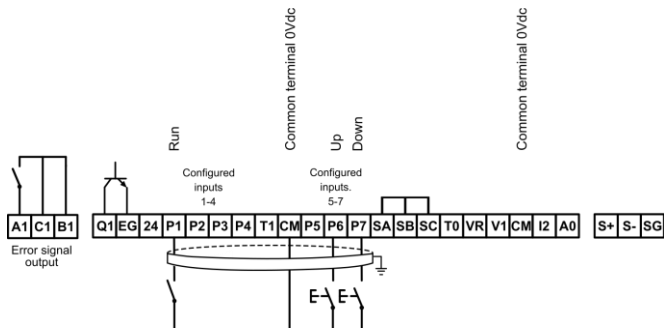
When the forward start command is sent (common CM), the drive will start and maintain speed at 0Hz. When P6 pushbutton is pressed, the speed will increase up to the minimum speed Ad.25, or to the speed stored in memory if Ad.65=Y

Connection scheme

Terminals CM/P1: Run command (NO state).

Terminals CM/P6: Up push button (NO state).

Terminals CM/P7: Down push button (NO state).



SD30DTC0011BI

Speed control (up/down potentiometer) and Start/Stop commands by terminals

Permanent Magnet Synchronous Motor control

Parameter configuration by functionalities

1. Basic Parameters drive/motor

These parameters are the necessary ones to correctly set the nameplate of the motor and the configuration of the drive. It is mandatory all parameters to be introduced since the thermal model and internal calculation depend on these parameters for the proper operation of the vector sensorless control.

Parameter	Default value	Description	Set value
dr.9	V/Hz	Control mode	6 PM Sensor-less
dr.14	-	Motor capacity	Depends on the motor capacity
dr.18	60.00Hz	Base frequency	Depends on the PM motor capacity
dr.20	60.00Hz	Maximum frequency	Depends on the PM motor capacity
bA.11	-	Motor pole number	4
bA.13	-	Rated motor current	Depends on the motor capacity
bA.15	0V	Motor-rated voltage	220/380/440/480
bA.16	-	Motor efficiency	Depends on the motor capacity
bA.19	380V	Motor input voltage	220/380

2. Internal motor parameters

These parameters are measured by the function “Auto-tuning”. To perform the autotuning, it is necessary the parameter bA.20 to be set at 7. The drive will perform diverse tests to extract the value of the parameters.

Parameter	Default value	Description	Set value
bA.20	0	Auto tuning	7 All PM
bA.32	100%	Q-axis inductance scale	100%
bA.34	33.3%	Auto tuning level for Ld and Lq	33.3%
bA.35	100.0%	Auto tuning frequency for Ld and Lq	100.0%

3. Speed loop controller Sensorless

For a PI speed controller, P gain is a proportional gain for the speed deviation. If the speed deviation becomes greater than the torque, the output command will increase accordingly. With a high value in P, the speed is regulated in faster way. Too high values can produce instability in the speed.

The speed controller I gain is the integral gain for speed deviation. It is the time taken for the gain to reach the rated torque output command while constant speed deviation continues. The lower the value becomes, the faster the speed deviation will decrease.

As the motor inertia varies by motor, the gain values should be changed according to the motor speeds. Cn.12 and Cn. 13 set the low speed P/I controller gain values, while Cn.15 and Cn.16 set the high speed P/I controller gain values, so that an appropriate gain value can be used for different motor speeds.

If the values of the speed regulator are too low, the speed could get overshoots when it tries to find the speed. If the values of this regulator is too high, the motor could get instabilities trying to find the speed.

Parameter	Default value	Description	Set value
Cn.12	100	PM speed controller P gain 1	100
Cn.13	150	PM speed controller I gain 1	150
Cn.15	100	PM speed controller P gain 2	100
Cn.16	150	PM speed controller I gain 2	150

4. Back EMF control loop

To ensure that the back-EMF with rotor position information can be properly estimated during a PM synchronous motor operation in sensorless vector control mode, set the following parameters values as a percentage of the proportional gain, which is designed to have a stable estimator polarity.

Higher values produce faster responses, with higher chances of increasing motor vibration.

Excessively low values may result in motor startup failure due to slow response rate.

For a short ramps of acceleration, it is recommended a low value set in Cn.33 (less than 100%), but initial torque could decrease. For fast ramps, it is recommended the value of Cn.33 to be increased.

Parameter	Default value	Description	Set value
Cn.33	100.0%	PM D-axis back-EMF estimated gain (%)	100.0%
Cn.34	100.0%	PM Q-axis back-EMF estimated gain (%)	100.0%

5. Initial pole searching

Initial pole position detection is a process to match the rotor position calculated by the variable speed drive and the current rotor position in a motor. In a permanent-magnet (PM) synchronous motor, rotor flux is generated by the permanent magnet attached to the rotor. Therefore, to run the motor in vector control mode, the exact rotor position (flux position) must be detected for an accurate control of the torque generated by the motor.

At Cn. 46 (InitAngle Sel), select the type of initial pole position detection.

When Cn. 46 is set to 0 (None), the motor is operated according to the pole position estimated by the drive's sensorless control algorithm, instead of detecting the physical position of the rotor pole.

When Cn.46 is set to 1 (Angle Detect), the motor is operated according to the pole position detected by changes in the current. The voltage pulse input is used to detect the pole position and it results in a small amount of noise at motor startup.

When Cn. 46 is set to 2 (Alignment), the drive forcefully align the rotor position by supplying DC current for a certain period of time.

Parameter	Default value	Description	Set value
Cn.35	2	Initial pole position estimation retry	2
Cn.36	20ms	Initial pole position estimation interval	20ms
Cn.37	15%	Initial pole position estimation pulse current (%)	15%
Cn.38	500%	Initial pole position estimation pulse voltage (%)	500%
Cn.46	1: Det. de ángulo	Initial pole position estimation type	1: Det. de ángulo

6. Voltage compensation

These parameters set the output compensation values during a PM synchronous motor operation in sensorless vector control mode.

If the motor fails operating at low speeds, at or below 5% of the rated motor speed, increase the parameter values set at Cn.39 and Cn.40 by 10% increments. Decrease the values in 10% decrements if a clanking noise occurs at motor startup and motor stop.

Parameter	Default value	Description	Set value
Cn.39	100.0%	PM dead-time range (%)	100.0%
Cn.40	100.0%	PM dead-time voltage (%)	100.0%

7. Speed and flux estimator loops

Set these parameters to change the speed estimator gain during a PM synchronous motor operation in sensorless vector control mode.

If fault trips occur or excessive oscillation is observed at low speed, decrease the Cn.41 value in 10% decrements until the motor operates stably.

If ripples occurs during normal operation, increase the value at Cn. 42.

The values at Cn.43 and Cn.44 are used for low speed operations in 200 V motors.

Set the high speed portion of the forward speed versus the counter the back-EMF during a PM synchronous motor operation in sensorless vector control mode. Feed forwarding enhances operation of the speed estimator.

Increase the value at Cn.45 in 10% increments to suppress motor oscillation under load. A fault trip may occur if this value is set too high

It is not recommended modifying these parameters, the default values are valid for the 90% of the applications.

Parameter	Default value	Description	Set value
Cn.41	100	PM speed estimator proportional gain	100
Cn.42	10	PM speed estimator integral gain	10
Cn.43	300	PM speed estimator proportional gain 2	300
Cn.44	30	PM speed estimator integral gain 2	30
Cn.45	300%	Speed estimator feedforward high speed range (%)	300%

8. Current loop controller

Set these parameters for setting the gain values for the PI current controller in a synchronous motor.

The P gain is the proportional gain for the current deviation. The current deviation decreases faster with higher values, as the deviation in voltage output command increases with increased deviation.

The I gain is the integral gain for the current deviation. Deviation in normal operation decreases with higher values.

However, the gain values are limited by the carrier frequency. A fault trip may occur due to interference if the gain values are set too high.

Parameter	Default value	Description	Set value
Cn.48	1200	Current controller P gain	1200
Cn.49	120	Current controller I gain	120

9. Voltage loop limiter controller

The PMSM motors have a handicap: to get the maximum torque at the maximum speed, it is necessary the nominal voltage of the motor. Due to the voltage drop in the drive, sometimes the drive is not able to supply the maximum voltage to the motor.

By overmodulation space vector algorithm, the drive is able to increase the output voltage using the parameters Cn.50 and Cn.51.

If it is not necessary, do not modify these parameters, if the motor supplies the torque desired at maximum speed. Increase these parameters can cause a higher THDi level in the motor, getting torque pulses.

Parameter	Default value	Description	Set value
Cn.50	10.0%	Voltage controller limit	10.0%
Cn.51	10.0%	Voltage controller I gain	10.0%

10. Limitador de par

It allows establishing torque limitations for the four quadrants in the operation of synchronous motors permanent magnets.

Parameter	Default value	Description	Set value
Cn.52	0ms	Torque controller output filter	0ms
Cn.53	LOCAL	Torque limit source	LOCAL
Cn.54	180.0%	FWD reverse torque limit	180.0%
Cn.55	180.0%	FWD regenerative torque limit	180.0%
Cn.56	180.0%	REV regenerative torque limit	180.0%
Cn.57	180.0%	REV reverse torque limit	180.0%

Commissioning

A few parameters must be modified for PM synchronous motor operation in sensorless vector control mode commissioning. The default parameters have been set for the 80-90% of the applications.

It is mandatory all parameters related with the nameplate of the motor and characteristics of the drive to be set:

Parameter	Default value	Description	Set value
dr.9	V/Hz	Control mode	6 PM Sensor-less
dr.14	-	Motor capacity	Depends on the motor capacity
dr.18	60.00Hz	Base frequency	Depends on the PM motor capacity
dr.20	60.00Hz	Maximum frequency	Depends on the PM motor capacity
bA.11	-	Motor pole number	4
bA.13	-	Rated motor current	Depends on the motor capacity

Parameter	Default value	Description	Set value
bA.15	0V	Motor-rated voltage	220 / 380 / 440 / 480
bA.16	-	Motor efficiency	Depends on the motor capacity
bA.19	380V	Motor input voltage	220 / 380

After introducing the basic parameters motor/drive, it is necessary to perform an autotuning to calculate the internal parameters of the motor:

Parameter	Default value	Description	Set value
bA.20	0	Autoajuste	7 Todo PM

After that, check if the motor turns correctly. If the motor turns in the lower speed irregularly, try to increase the parameter of Back EMF:

Parameter	Default value	Description	Set value
Cn.33	100.0%	PM D-axis back-EMF estimated gain (%)	100.0%

The following parameters are used for the starting as well. If the acceleration ramp is too slow and the motor works irregularly these parameter must be decreased. If the ramp is very fast, increase the parameters to provide stability.

If for high speed operation the speed is unstable, the speed loops regulators could be modified:

Parameter	Default value	Description	Set value
Cn.12	100	PM speed controller P gain 1	100
Cn.13	150	PM speed controller I gain 1	150
Cn.15	100	PM speed controller P gain 2	100
Cn.16	150	PM speed controller I gain 2	150

If the motor gets overshoot of the speed, increase the value of P, and for the fine tune, increase the value of I. If the motor is not able to keep the speed on, because the speed is very “nervous”, decrease the value of P and for the fine tune decrease the I.

For high dynamic applications, the current loop regulator might be modified:

Parameter	Default value	Description	Set value
Cn.48	1200	Current controller P gain	1200
Cn.49	120	Current controller I gain	120

For high dynamic applications, the regulator values could be increased in order to give stability to the system. For very slow dynamins the regulator values could be decreased in order to give a better operation in the motor (e.g. getting a constant torque in applications such as positive displacement pumps)

Finally, if you have not been able to make the motor work properly, you should initialize all parameters and retry the process from the beginning again. Maybe the result of the autotuning was not very good and the drive was not able to calculate properly the vector position.

Parameter	Default value	Description	Set value
dr.93	0 No	Initialization parameters	1 All parameters

CONFIGURATION REGISTER

18

VARIABLE SPEED DRIVE: SD300.

SERIAL N°: MODEL:

APPLICATION:

DATE:

CUSTOMER:

NOTES:

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
dr: Drive			
0.00 Local speed	0.00Hz	_____	_____
dr.2 Local torque	0.0%	_____	_____
ACC Acceleration ramp	20.0s	_____	_____
dEC Deceleration ramp	30.0s	_____	_____
drv Control mode 1	REMOTE	_____	_____
Frq Speed reference 1	LOCAL	_____	_____
dr.08 Torque reference 1	LOCAL	_____	_____
dr.9 Control type	V/Hz	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
dr.10 Torque control	N	_____	_____
dr.11 Inch Frequency	10.00Hz	_____	_____
dr.12 INCH accel. time	20.0s	_____	_____
dr.13 INCH decel. time	30.0s	_____	_____
dr.14 Motor power	__ kW	_____	_____
dr.15 Torque boost	Manual	_____	_____
dr.16 Start torque FW. direction	2.0%	_____	_____
dr.17 Start torque in reverse direction	2.0%	_____	_____
dr.18 Motor frequency	60.00Hz	_____	_____
dr.19 Start frequency	0.5Hz	_____	_____
dr.20 Max speed limit	60.00Hz	_____	_____
dr.21 Hz/Rpm Display	Hz	_____	_____
dr.80 Select range	Run Freq.	_____	_____
dr.81 Select monitor code	Volt V	_____	_____
dr.89 Display changed parameters	All	_____	_____
dr.90 ESC key function	Mov. In. Pos.	_____	_____
dr.91 Eloader function	None	_____	_____
dr.93 Parameter initialization	No	_____	_____
dr.94 Register password	0	_____	_____
dr.95 Lock password	0	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
dr.97 Software version	0	_____	_____
dr.98 IO Software version	0	_____	_____
dr.99 Hardware version	0	_____	_____
bA: Basic Functions			
bA.1 Alt Speed Ref	None	_____	_____
bA.2 Aux calculation type	M+(G*A)	_____	_____
bA.3 Auxiliary reference gain	100.0%	_____	_____
bA.4 Control mode 2	REMOTE	_____	_____
bA.5 Speed reference source 2	LOCAL	_____	_____
bA.6 Alternative torque reference	LOCAL	_____	_____
bA.7 V/F Pattern	Linear	_____	_____
bA.8 Acceleration ramp type	MaxFreq	_____	_____
bA.9 Time scale	0.1s	_____	_____
bA.10 Input Frequency	60Hz	_____	_____
bA.11 Pole Number	4	_____	_____
bA.12 Rated Slip	40rpm	_____	_____
bA.13 Motor Current	3.6A	_____	_____
bA.14 No load Current	1.6A	_____	_____
bA.15 Motor Voltage	0V	_____	_____
bA.16 Efficiency	72%	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
bA.17 Inertia Rate	0	_____	_____
bA.18 Output power adjustment	100%	_____	_____
bA.19 Input voltage	220V→220 440V→380	_____	_____
bA.20 Auto tuning	None	_____	_____
bA.21 Stator Resistor	0	_____	_____
bA.22 Leak Inductor	__mH	_____	_____
bA.23 Stator Inductor	__mH	_____	_____
bA.24 Rotor Time Const	145ms	_____	_____
bA.25 Stator inductance scale.	100%	_____	_____
bA.26 Rotor time constant scale.	100%	_____	_____
bA.31 Regeneration inductance scale	80%	_____	_____
bA.32 Q-axis inductance scale	100%	_____	_____
bA.34 Auto tuning level for Ld and Lq	33.3%	_____	_____
bA.35 Auto tuning frequency for Ld and Lq	100.0%	_____	_____
bA.41 User Frequency 1	15.00Hz	_____	_____
bA.42 User Voltage 1	25%	_____	_____
bA.43 User Frequency 2	30.00Hz	_____	_____
bA.44 User Voltage 2	50%	_____	_____
bA.45 User Frequency 3	45.00Hz	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
bA.46 User Voltage 4	75%	_____	_____
bA.47 User Frequency 4	0.00Hz	_____	_____
bA.48 User Voltage 5	0%	_____	_____
St1 Multi-Reference 1	10.00%	_____	_____
St2 Multi-Reference 2	20.00%	_____	_____
St3 Multi-Reference 3	30.00%	_____	_____
bA.53 Multi-Reference 4	40.00%	_____	_____
bA.54 Multi-Reference 5	50.00%	_____	_____
bA.55 Multi-Reference 6	60.00%	_____	_____
bA.56 Multi-Reference 7	60.00%	_____	_____
bA.70 Acceleration ramp 2	20.0s	_____	_____
bA.71 Deceleration ramp 2	30.0s	_____	_____
bA.72 Acceleration ramp 3	20.0s	_____	_____
bA.73 Deceleration ramp 3	30.0s	_____	_____
bA.74 Acceleration ramp 4	20.0s	_____	_____
bA.75 Deceleration ramp 4	30.0s	_____	_____
bA.76 Acceleration ramp 5	20.0s	_____	_____
bA.77 Deceleration ramp 5	30.0s	_____	_____
bA.78 Acceleration ramp 6	20.0s	_____	_____
bA.79 Deceleration ramp 6	30.0s	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
bA.80 Acceleration ramp 7	20.0s	_____	_____
bA.81 Deceleration ramp 7	30.0s	_____	_____
bA.82 Acceleration ramp 8	20.0s	_____	_____
bA.83 Deceleration ramp 8	30.0s	_____	_____
Ad: Expanded Functions			
Ad.1 Acceleration pattern	Linear	_____	_____
Ad.2 Deceleration pattern	Linear	_____	_____
Ad.3 S curve start acceleration slope	40%	_____	_____
Ad.4 S curve stop acceleration slope	40%	_____	_____
Ad.5 S curve start decal. slope	40%	_____	_____
Ad.6 S curve stop decal. slope	40%	_____	_____
Ad.7 Motor start mode	RAMP	_____	_____
Ad.8 Stop mode	RAMP	_____	_____
Ad.9 Allow speed inversion	None	_____	_____
Ad.10 Power-on Run	N	_____	_____
Ad.12 Time to DC start	0.00s	_____	_____
Ad.13 Current injection DC start	50%	_____	_____
Ad.14 Pre-DC brake time	0.10s	_____	_____
Ad.15 DC brake time	1.00s	_____	_____
Ad.16 Current level DC brake	50%	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
Ad.17 Frequency start DC brake	5.00Hz	_____	_____
Ad.20 Acceleration dwell frequency	5.00Hz	_____	_____
Ad.21 Acceleration dwell time	0.0s	_____	_____
Ad.22 Deceleration dwell frequency	5.00Hz	_____	_____
Ad.23 Deceleration dwell time	0.0s	_____	_____
Ad.24 Use frequency limit	N	_____	_____
Ad.25 Frequency lower limit	0.50Hz	_____	_____
Ad.26 Frequency higher limit	□/dr.20Hz	_____	_____
Ad.27 Jump frequency activation	N	_____	_____
Ad.28 Lower limit jump frequency 1	10.00Hz	_____	_____
Ad.29 Upper limit jump frequency 1	15.00Hz	_____	_____
Ad.30 Lower limit jump frequency 2	20.00Hz	_____	_____
Ad.31 Upper limit jump frequency 2	25.00Hz	_____	_____
Ad.32 Lower limit jump frequency 3	30.00Hz	_____	_____
Ad.33 Upper limit jump frequency 3	35.00Hz	_____	_____
Ad.41 Open brake current	50.0%	_____	_____
Ad.42 Delay before brake opening	1.00s	_____	_____
Ad.44 Brake opening forward freq.	1.00Hz	_____	_____
Ad.45 Brake opening reverse freq.	1.00Hz	_____	_____
Ad.46 Delay before brake closing	1.00s	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
Ad.47 Brake closing frequency	2.00Hz	_____	_____
Ad.50 Minimum flux mode	NONE	_____	_____
Ad.51 Minimum flux level in manual mode	0%	_____	_____
Ad.60 Acceleration dwell frequency	0.00Hz	_____	_____
Ad.64 Fan operating mode	During Run	_____	_____
Ad.65 Save motorized potentiometer frequency	N	_____	_____
Ad.66 Select comparator source	None	_____	_____
Ad.67 Output activation level comparator mode	90.00%	_____	_____
Ad.68 Output deactivation level comparator mode	10.00%	_____	_____
Ad.70 Safe operation selection	Always Enable	_____	_____
Ad.71 Safe operation stop	Free Run	_____	_____
Ad.72 Q-Stop Time	5.0s	_____	_____
Ad.74 Enable regeneration prevention	N	_____	_____
Ad.75 Regeneration prevention level	700V	_____	_____
Ad.76 Compare frequency limit	1.00Hz	_____	_____
Ad.77 P gain regeneration prevention	50.0%	_____	_____
Ad.78 I gain regeneration prevention	50.0ms	_____	_____
Ad.80 Fire mode selection	None	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
Ad.81 Fire mode frequency	60.00Hz	_____	_____
Ad.82 Fire mode direction	Forward	_____	_____
Cn: Control Functions			
Cn.4 Modulation frequency	2.0 / 3.0kHz	_____	_____
Cn.5 Modulation mode	Normal PWM	_____	_____
Cn.9 Pre-excitation time	1.00s	_____	_____
Cn.10 Pre-excitation flux	100.0%	_____	_____
Cn.11 Power off delay	0.00s	_____	_____
Cn.12 PM speed controller P gain 1	100	_____	_____
Cn.13 PM speed controller I gain 1	150	_____	_____
Cn.15 PM speed controller P gain 2	100	_____	_____
Cn.16 PM speed controller I gain 2	150	_____	_____
Cn.20 Sensorless control gain 2	N	_____	_____
Cn.21 ASR proportional gain 1	____%	_____	_____
Cn.22 ASR integral time 1	____ms	_____	_____
Cn.23 Independent controller proportional gain 2	_____%	_____	_____
Cn.24 Independent controller integral gain 2	_____%	_____	_____
Cn.25 Integral time sensorless controller	____ms	_____	_____
Cn.26 Flux estimator proportional gain	____%	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
Cn.27 Flux estimator integral gain	—%	_____	_____
Cn.28 Speed estimator proportional gain 1	—	_____	_____
Cn.29 Speed estimator integral gain 1	—	_____	_____
Cn.30 Speed estimator integral gain 2	—	_____	_____
Cn.31 Sensorless cont. proportional gain	—	_____	_____
Cn.32 Sensorless controller integral gain	—	_____	_____
Cn.33 PM D-axis back-EMF estimated gain (%)	100.0%	_____	_____
Cn.34 PM Q-axis back-EMF estimated gain (%)	2	_____	_____
Cn.35 Initial pole position estimation retry	20ms	_____	_____
Cn.36 Initial pole position estimation interval	15%	_____	_____
Cn.37 Initial pole position estimation pulse current (%)	500%	_____	_____
Cn.38 Initial pole position estimation pulse voltage (%)	100.0%	_____	_____
Cn.39 PM dead-time range (%)	20ms	_____	_____
Cn.40 PM dead-time voltage (%)	100.0%	_____	_____
Cn.41 PM speed estimator proportional gain	100	_____	_____
Cn.42 PM speed estimator integral gain	10	_____	_____
Cn.43 PM speed estimator proportional gain 2	300	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
Cn.44 PM speed estimator integral gain 2	30	_____	_____
Cn.45 Speed estimator feedforward high speed range (%)	300%	_____	_____
Cn.46 Initial pole position estimation type	1: Angle Detect	_____	_____
Cn.48 Controller P gain	1200	_____	_____
Cn.49 Controller I gain	120	_____	_____
Cn.50 Voltage controller limit	10.0%	_____	_____
Cn.51 Voltage controller I gain	10.0%	_____	_____
Cn.52 Output filter vector	0ms	_____	_____
Cn.53 Torque limit reference	LOCAL	_____	_____
Cn.54 Forward positive torque limit	180.0%	_____	_____
Cn.55 Forward negative torque limit	180.0%	_____	_____
Cn.56 Reverse positive torque limit	180.0%	_____	_____
Cn.57 Reverse negative torque limit	180.0%	_____	_____
Cn.62 Speed limit reference	LOCAL	_____	_____
Cn.63 Forward speed limit	50.00Hz	_____	_____
Cn.64 Reverse speed limit	50.00Hz	_____	_____
Cn.65 Speed limit gain	500%	_____	_____
Cn.70 Speed search mode selection	Flying Start1	_____	_____
Cn.71 Search mode	0000	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
Cn.72 Speed search mode current	150%	_____	_____
Cn.73 Speed search mode proportional gain	100/600	_____	_____
Cn.74 Speed search mode integral gain	100/600	_____	_____
Cn.75 Speed search delay	1.0s	_____	_____
Cn.76 Speed estimator gain	100%	_____	_____
Cn.77 KEB Select	No	_____	_____
Cn.78 Initial value for KEB operation	125.0%	_____	_____
Cn.79 Value to stop KEB operation	130.0%	_____	_____
Cn.80 KEB proportional gain	10000	_____	_____
Cn.81 KEB integral gain	500	_____	_____
Cn.82 Energy buffering Slip gain	30.0	_____	_____
Cn.83 Energy buffering acceleration time	10.0	_____	_____
Cn.85 Flux proportional gain 1	370	_____	_____
Cn.86 Flux proportional gain 2	0	_____	_____
Cn.87 Flux proportional gain 3	100	_____	_____
Cn.88 Flux integral gain 1	50	_____	_____
Cn.89 Flux integral gain 2	50	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
Cn.90 Flux integral gain 2	—	_____	_____
Cn.91 Sensorless voltage compensation 1	—	_____	_____
Cn.92 Sensorless voltage compensation 2	—	_____	_____
Cn.93 Sensorless voltage compensation 3	20	_____	_____
Cn.94 Sensorless fluctuation frequency	100.0%	_____	_____
Cn.95 Sensorless switching frequency	2.00Hz	_____	_____
In: Inputs			
In.1 Analog input max. freq	dr.20	_____	_____
In.2 Analog input max. torque	100.0%	_____	_____
In.5 V1 Monitor	0.00V	_____	_____
In.6 V1 polarity	0-10V	_____	_____
In.7 V1 filter	10ms	_____	_____
In.8 V1 minimum voltage	0.00V	_____	_____
In.9 V1 minimum reference	0.00%	_____	_____
In.10 V1 maximum voltage	10.00V	_____	_____
In.11 V1 maximum reference	10.00%	_____	_____
In.12 V1 minimum negative voltage	-10.00V	_____	_____
In.13 V1 minimum negative reference	-10.00%	_____	_____
In.14 V1 maximum negative voltage	-10.00V	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
In.15 V1 maximum negative reference	-10.00%	_____	_____
In.16 V2 Inverting	N	_____	_____
In.17 Adjust V1 quantification	0.04%	_____	_____
In.35 V2 Monitor	0.00V	_____	_____
In.37 V2 filter	10ms	_____	_____
In.38 V2 minimum voltage	0.00V	_____	_____
In.39 V2 minimum reference	0.00%	_____	_____
In.40 V2 maximum current	10.00V	_____	_____
In.41 V2 maximum reference	100.00%	_____	_____
In.46 V2 Inverting	N	_____	_____
In.47 Adjust I2 visualization	0.04%	_____	_____
In.50 I2 Monitor	0.00mA	_____	_____
In.52 I2 filter	10ms	_____	_____
In.53 I2 minimum current	4.00mA	_____	_____
In.54 I2 minimum reference	0.00%	_____	_____
In.55 I2 maximum current	10.00mA	_____	_____
In.56 I2 maximum reference	100.00%	_____	_____
In.61 I2 Inverting	N	_____	_____
In.62 Adjust I2 visualization	0.04%	_____	_____
In.65 Digital input 1	1	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
In.66			
Digital input 2	2	_____	_____
In.67			
Digital input 3	3	_____	_____
In.68			
Digital input 4	3	_____	_____
In.69			
Digital input 5	7	_____	_____
In.70			
Digital input 6	8	_____	_____
In.71			
Digital input 7	9	_____	_____
In.85			
Digital input activation delay	10ms	_____	_____
In.86			
DI deactivation delay	3ms	_____	_____
In.87			
Digital input contact type	0000	_____	_____
In.89			
DI scan time	1ms	_____	_____
In.90			
Digital inputs status	0000	_____	_____
In.91			
TI Monitor	0.00kHz	_____	_____
In.92			
TI Filter	400ms	_____	_____
In.93			
TI minimum input frequency	0.00kHz	_____	_____
In.94			
TI minimum input frequency percentage	0.00%	_____	_____
In.95			
TI maximum input frequency	32.00kHz	_____	_____
In.96			
TI max. input freq. %	100.00%	_____	_____
In.97			
TI Inverting	N	_____	_____
In.98			
TI noise reduction level	0.04%	_____	_____
In.99			
Input mode setting	00	_____	_____
OU: Outputs			
OU.1			
Analog output 1 mode selection	Frequency	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
OU.2 Analog output 1 gain	100.0%	_____	_____
OU.3 Analog output 1 offset	0.0%	_____	_____
OU.4 Analog output 1 filter	5ms	_____	_____
OU.5 Analog output 1 constant setting	0.0%	_____	_____
OU.6 Analog output 1 monitor	0.0%	_____	_____
OU.30 Relay fault output	010	_____	_____
OU.31 Relay 1 control source	Trip	_____	_____
OU.33 Digital output 1 function	Run	_____	_____
OU.41 Digital outputs status	00	_____	_____
OU.50 Digital output connection delay	0.00s	_____	_____
OU.51 Digital output disconnection delay	0.00s	_____	_____
OU.52 NC/NO Relays logic	00	_____	_____
OU.53 Digital output connection delay on fault	0.00s	_____	_____
OU.54 Digital output disconnection delay on fault	0.00s	_____	_____
OU.55 Digital output connection delay	0.00s	_____	_____
OU.56 Digital output disconnection delay	0.00s	_____	_____
OU.57 Relay FDT level	30.00Hz	_____	_____
OU.58 Relay FDT band	10.00Hz	_____	_____
OU.61 Pulse output mode	Frequency	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
OU.62 Pulse output gain	100.0%	_____	_____
OU.63 Pulse output offset	0.0%	_____	_____
OU.64 Pulse output filter	5ms	_____	_____
OU.65 Pulse output constant setting	0.0%	_____	_____
OU.66 Pulse output monitor	0.0%	_____	_____
CM: Communications			
CM.1 Slave address	1	_____	_____
CM.2 Communication protocol	Modbus	_____	_____
CM.3 Baud rate	9600bps	_____	_____
CM.4 Communication frame structure	D8/PN/S1	_____	_____
CM.5 Response delay	5ms	_____	_____
CM.6 Communication option S/W version	0.00	_____	_____
CM.7 Communication option ID	1	_____	_____
CM.8 Card baud rate	12Mbps	_____	_____
CM.9 Communication option LED status	-	_____	_____
CM.30 Output parameters number	3	_____	_____
CM.31 Output comm. address 1	000A	_____	_____
CM.32 Output comm. address 2	000E	_____	_____
CM.33 Output comm. address 3	000F	_____	_____
CM.34 Output comm. address 4	0000	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
CM.35 Output comm. address 5	0000	_____	_____
CM.36 Output comm. address 6	0000	_____	_____
CM.37 Output comm. address 7	0000	_____	_____
CM.38 Output comm. address 8	0000	_____	_____
CM.50 Number of input parameters	2	_____	_____
CM.51 Input comm. address 1	0005	_____	_____
CM.52 Input comm. address 2	0006	_____	_____
CM.53 Input comm. address 3	0000	_____	_____
CM.54 Input comm. address 4	0000	_____	_____
CM.55 Input comm. address 5	0000	_____	_____
CM.56 Input comm. address 6	0000	_____	_____
CM.57 Input comm. address 7	0000	_____	_____
CM.58 Input comm. address 8	0000	_____	_____
CM.68 Field bus data swap	0	_____	_____
CM.70 Communication multifunction input 1	None	_____	_____
CM.71 Communication multifunction input 2	None	_____	_____
CM.72 Communication multifunction input 3	None	_____	_____
CM.73 Communication multifunction input 4	None	_____	_____
CM.74 Communication multifunction input 5	None	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
CM.75 Communication multifunction input 6	None	_____	_____
CM.76 Communication multifunction input 7	None	_____	_____
CM.77 Communication multifunction input 8	None	_____	_____
CM.86 Comm. multifunction input monitoring	0	_____	_____
CM.90 Data frame comm. monitor	0	_____	_____
CM.91 Received data frames counter	0	_____	_____
CM.92 Frames with error counter	0	_____	_____
CM.93 NAK frames	0	_____	_____
CM.94 Communications update	NO	_____	_____
CM.95 P2P communication selection	Disable all	_____	_____
CM.96 Digital output selection	0	_____	_____

AP: PID

AP.1 Application function selection	Proc PID	_____	_____
AP.2 Enable PLC mode	N	_____	_____
AP.16 PID output	+0.0%	_____	_____
AP.17 PID reference	+50.00%	_____	_____
AP.18 PID feedback	+0.00%	_____	_____
AP.19 PID local	+50.00%	_____	_____
AP.20 Select PID regulator source	MREF	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
AP.21 Select feedback signal source	V1	_____	_____
AP.22 PID controller proportional gain	+50.00%	_____	_____
AP.23 PID controller integration time	10.0ms	_____	_____
AP.24 PID controller differential time	0ms	_____	_____
AP.25 PID output fine adjustment	+0.0%	_____	_____
AP.26 Proportional gain scale	100.0%	_____	_____
AP.27 PID Filter	0ms	_____	_____
AP.28 PID mode	Process	_____	_____
AP.29 Upper limit PID output	+60.00Hz	_____	_____
AP.30 Lower limit PID output	-60.00Hz	_____	_____
AP.31 Invert PID	N	_____	_____
AP.32 PID output scale	+100.00%	_____	_____
AP.34 PrePID reference	0.00Hz	_____	_____
AP.35 PrePID end reference	0.0%	_____	_____
AP.36 PrePID delay	600s	_____	_____
AP.37 Sleep mode activation delay	60.0s	_____	_____
AP.38 Sleep mode activation speed	0.00Hz	_____	_____
AP.39 Awakening level	+35%	_____	_____
AP.40 PID WakeUp mode	Below	_____	_____
AP.42 PID unit	%	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
AP.43 PID unit gain	100.00%	_____	_____
AP.44 PID scale unit	x1	_____	_____
AP.45 Proportional gain 2	100.0%	_____	_____
Pr: Protections			
Pr.4 Load duty type	Heavy	_____	_____
Pr.5 Phase loss type	NONE	_____	_____
Pr.6 Ripple voltage	15V	_____	_____
Pr.7 Fault deceleration time	3.0s	_____	_____
Pr.8 Start after restart	N	_____	_____
Pr.9 Retry attempts number	0	_____	_____
Pr.10 Retry delay	1.0s	_____	_____
Pr.12 Response in case of a speed reference loss	None	_____	_____
Pr.13 Lost reference delay	1.0s	_____	_____
Pr.14 Reference for lost reference	0.00Hz	_____	_____
Pr.15 AI Lost Level	Half	_____	_____
Pr.17 Overload warning select	YES	_____	_____
Pr.18 Overload warning level	+150%	_____	_____
Pr.19 Overload warning time	10.0s	_____	_____
Pr.20 Overload trip select	FreeRun	_____	_____
Pr.21 Overload level	180%	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
Pr.22 Overload trip time	60.0s	_____	_____
Pr.25 Enable underload	YES	_____	_____
Pr.26 Underload warning delay	10.0s	_____	_____
Pr.27 Underload fault mode	None	_____	_____
Pr.28 Underload fault delay	30.0	_____	_____
Pr.29 Underload minimum level	+30%	_____	_____
Pr.30 Underload maximum level	+30%	_____	_____
Pr.31 Action in case no motor is detected	None	_____	_____
Pr.32 No motor fault level	+5%	_____	_____
Pr.33 No motor fault delay	3.0s	_____	_____
Pr.40 Action in case of thermo-electronic fault	None	_____	_____
Pr.41 Motor cooling mode at zero speed	SELF	_____	_____
Pr.42 Overcurrent level during 1 min	150%	_____	_____
Pr.43 Continuous overcurrent level	+120%	_____	_____
Pr.45 Free run trip mode	FreeRun	_____	_____
Pr.50 Stall prevention	00	_____	_____
Pr.51 Speed for stall protection 1	60Hz	_____	_____
Pr.52 Level for stall protection 1	180%	_____	_____
Pr.53 Speed for stall protection 2	60Hz	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
Pr.54 Level for stall protection 2	180%	_____	_____
Pr.55 Speed for stall protection 3	60Hz	_____	_____
Pr.56 Level for stall protection 3	180%	_____	_____
Pr.57 Speed for stall protection 4	60Hz	_____	_____
Pr.58 Level for stall protection 4	180%	_____	_____
Pr.59 Flux braking gain	0%	_____	_____
Pr.60 CAP diagnosis level	0%	_____	_____
Pr.61 Capacitor diagnosis mode	+0%	_____	_____
Pr.62 CAP exchange warning level	0%	_____	_____
Pr.63 Capacitance reference	0.0%	_____	_____
Pr.66 Braking resistor configuration	+0%	_____	_____
Pr.73 Speed deviation fault	N	_____	_____
Pr.74 Speed deviation band	50	_____	_____
Pr.75 Speed deviation time	60	_____	_____
Pr.79 Action in case of fan trip	Warn	_____	_____
Pr.80 Optional card trip mode	FreeRun	_____	_____
Pr.81 Low voltage trip delay	0.0s	_____	_____
Pr.82 Enable low voltage trip	YES	_____	_____
Pr.86 Fan use percentage	0%	_____	_____
Pr.87 Fan exchange warning level	90.0%	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
Pr.88 Fan time reset	N	_____	_____
Pr.89 CAP fan status	0	_____	_____
Pr.90 Warning information	-	_____	_____
Pr.91 Fifth fault	nOn	_____	_____
Pr.92 Fourth fault	nOn	_____	_____
Pr.93 Third fault	nOn	_____	_____
Pr.94 Second fault	nOn	_____	_____
Pr.95 First fault	nOn	_____	_____
Pr.96 Reset fault history	0	_____	_____

M2: Second Motor

M2.4 Motor 2 acceleration ramp	20.0s	_____	_____
M2.5 Motor 2 deceleration ramp	30.0s	_____	_____
M2.6 Motor 2 rated power	4.0kW	_____	_____
M2.7 Motor 2 frequency	60.00Hz	_____	_____
M2.8 Control type selection	V/Hz	_____	_____
M2.10 Poles number	—	_____	_____
M2.11 Rated Slip	__rpm	_____	_____
M2.12 Motor nominal current	__A	_____	_____
M2.13 No load current	__A	_____	_____
M2.14 Motor 2 voltage	__V	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
M2.15 Motor 2 efficiency	___%	_____	_____
M2.16 Motor 2 inertia rate	___	_____	_____
M2.17 Stator resistor	___mΩ	_____	_____
M2.18 Leak inductor	___m	_____	_____
M2.19 Stator inductor	___mH	_____	_____
M2.20 Rotor time constant	___ms	_____	_____
M2.25 V/F pattern	Linear	_____	_____
M2.26 Torque in forward direction	+2.0%	_____	_____
M2.27 Torque in reverse direction	+2.0%	_____	_____
M2.28 Stall prevention level motor 2	150%	_____	_____
M2.29 Motor 2 overcurrent level during 1 minute	+150%	_____	_____
M2.30 Motor 2 continuous overcurrent level	+100%	_____	_____
US: PLC Sequence			
US.1 PLC operation mode	Stop	_____	_____
US.2 PLC loop time	0.02s	_____	_____
US.11 Output link address for PLC function 1	0	_____	_____
US.12 Output link address for PLC function 2	0	_____	_____
US.13 Output link address for PLC function 3	0	_____	_____
US.14 Output link address for PLC function 4	0	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
US.15 Output link address for PLC function 5	0	_____	_____
US.16 Output link address for PLC function 6	0	_____	_____
US.17 Output link address for PLC function 7	0	_____	_____
US.18 Output link address for PLC function 8	0	_____	_____
US.19 Output link address for PLC function 9	0	_____	_____
US.20 Output link address for PLC function 10	0	_____	_____
US.21 Output link address for PLC function 11	0	_____	_____
US.22 Output link address for PLC function 12	0	_____	_____
US.23 Output link address for PLC function 13	0	_____	_____
US.24 Output link address for PLC function 14	0	_____	_____
US.25 Output link address for PLC function 15	0	_____	_____
US.26 Output link address for PLC function 16	0	_____	_____
US.27 Output link address for PLC function 17	0	_____	_____
US.28 Output link address for PLC function 18	0	_____	_____
US.31 PLC input value 1	0	_____	_____
US.32 PLC input value 2	0	_____	_____
US.33 PLC input value 3	0	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
US.34 PLC input value 4	0	_____	_____
US.35 PLC input value 5	0	_____	_____
US.36 PLC input value 6	0	_____	_____
US.37 PLC input value 7	0	_____	_____
US.38 PLC input value 8	0	_____	_____
US.39 PLC input value 9	0	_____	_____
US.40 PLC input value 10	0	_____	_____
US.41 PLC input value 11	0	_____	_____
US.42 PLC input value 12	0	_____	_____
US.43 PLC input value 13	0	_____	_____
US.44 PLC input value 14	0	_____	_____
US.45 PLC input value 15	0	_____	_____
US.46 PLC input value 16	0	_____	_____
US.47 PLC input value 17	0	_____	_____
US.48 PLC input value 18	0	_____	_____
US.49 PLC input value 19	0	_____	_____
US.50 PLC input value 20	0	_____	_____
US.51 PLC input value 21	0	_____	_____
US.52 PLC input value 22	0	_____	_____
US.53 PLC input value 23	0	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
US.54 PLC input value 24	0	_____	_____
US.55 PLC input value 25	0	_____	_____
US.56 PLC input value 26	0	_____	_____
US.57 PLC input value 27	0	_____	_____
US.58 PLC input value 28	0	_____	_____
US.59 PLC input value 29	0	_____	_____
US.60 PLC input value 30	0	_____	_____
US.80 Analogue input V1 value	0.000	_____	_____
US.81 Analogue input I2 value	+0.000	_____	_____
US.82 Digital inputs value	0	_____	_____
US.85 Analogue output value	-	_____	_____
US.88 Digital output value	0	_____	_____
UF: PLC Function			
UF.1 PLC function 1	NOP	_____	_____
UF.2 Input A PLC function 1	0	_____	_____
UF.3 Input B PLC function1	0	_____	_____
UF.4 Input C PLC function1	0	_____	_____
UF.5 Output PLC function 1 PLC	+0	_____	_____
UF.6 PLC function 2	NOP	_____	_____
UF.7 Input A PLC function 2	0	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
UF.8 Input B PLC function 2	0	_____	_____
UF.9 Input C PLC function 2	0	_____	_____
UF.10 Output PLC function 2	+0	_____	_____
UF.11 PLC function 3	NOP	_____	_____
UF.12 Input A PLC function 3	0	_____	_____
UF.13 Input B PLC function 3	0	_____	_____
UF.14 Input C PLC function 3	0	_____	_____
UF.15 Output PLC function 3	+0	_____	_____
UF.16 PLC function 4	NOP	_____	_____
UF.17 Input A PLC function 4	0	_____	_____
UF.18 Input B PLC function 4	0	_____	_____
UF.19 Input C PLC function 4	0	_____	_____
UF.20 Output PLC function 4	+0	_____	_____
UF.21 PLC function 5	NOP	_____	_____
UF.22 Input A PLC function 5	0	_____	_____
UF.23 Input B PLC function 5	0	_____	_____
UF.24 Input C PLC function 5	0	_____	_____
UF.25 Output PLC function 5	+0	_____	_____
UF.26 PLC function 6	NOP	_____	_____
UF.27 Input A PLC function 6	0	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
UF.28 Input B PLC function 6	0	_____	_____
UF.29 Input C PLC function 6	0	_____	_____
UF.30 Output PLC function 6	+0	_____	_____
UF.31 PLC function 7	NOP	_____	_____
UF.32 Input A PLC function 7	0	_____	_____
UF.33 Input B PLC function 7	0	_____	_____
UF.34 Input C PLC function 7	0	_____	_____
UF.35 Output PLC function 7	+0	_____	_____
UF.36 PLC function 8	NOP	_____	_____
UF.37 Input A PLC function 8	0	_____	_____
UF.38 Input B PLC function 8	0	_____	_____
UF.39 Input C PLC function 8	0	_____	_____
UF.40 Output PLC function 1	+0	_____	_____
UF.41 PLC function 9	NOP	_____	_____
UF.42 Input A PLC function 9	0	_____	_____
UF.43 Input B PLC function 9	0	_____	_____
UF.44 Input C PLC function 9	0	_____	_____
UF.45 Output PLC function 9	+0	_____	_____
UF.46 PLC function 10	NOP	_____	_____
UF.47 Input A PLC function 10	0	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
UF.48 Input B PLC function 10	0	_____	_____
UF.49 Input C PLC function 10	0	_____	_____
UF.50 Output PLC function 10	+0	_____	_____
UF.51 PLC function 11	NOP	_____	_____
UF.52 Input A PLC function 11	0	_____	_____
UF.53 Input B PLC function 11	0	_____	_____
UF.54 Input C PLC function 11	0	_____	_____
UF.55 Output PLC function 11	+0	_____	_____
UF.56 PLC function 12	NOP	_____	_____
UF.57 Input A PLC function 12	0	_____	_____
UF.58 Input B PLC function 12	0	_____	_____
UF.59 Input C PLC function 12	0	_____	_____
UF.60 Output PLC function 12	+0	_____	_____
UF.61 PLC function 13	NOP	_____	_____
UF.62 Input A PLC function 13	0	_____	_____
UF.63 Input B PLC function 13	0	_____	_____
UF.64 Input C PLC function 13	0	_____	_____
UF.65 Output PLC function 13	+0	_____	_____
UF.66 PLC function 14	NOP	_____	_____
UF.67 Input A PLC function 14	0	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
UF.68 Input B PLC function 14	0	_____	_____
UF.69 Input C PLC function 14	0	_____	_____
UF.70 Output PLC function 14	+0	_____	_____
UF.71 PLC function 15	NOP	_____	_____
UF.72 Input A PLC function 15	0	_____	_____
UF.73 Input B PLC function 15	0	_____	_____
UF.74 Input C PLC function 15	0	_____	_____
UF.75 Output PLC function 15	+0	_____	_____
UF.76 PLC function 16	NOP	_____	_____
UF.77 Input A PLC function 16	0	_____	_____
UF.78 Input B PLC function 16	0	_____	_____
UF.79 Input C PLC function 16	0	_____	_____
UF.80 Output PLC function 16	+0	_____	_____
UF.81 PLC function 17	NOP	_____	_____
UF.82 Input A PLC function 17	0	_____	_____
UF.83 Input B PLC function 17	0	_____	_____
UF.84 Input C PLC function 17	0	_____	_____
UF.85 Output PLC function 17	+0	_____	_____
UF.86 PLC function 18	NOP	_____	_____
UF.87 Input A PLC function 18	0	_____	_____

PARAMETER	DEFAULT VALUE	SETTING 1	SETTING 2
UF.88 Input B PLC function 18	0	_____	_____
UF.89 Input C PLC function 18	0	_____	_____
UF.90 Output PLC function 18 PLC	+0	_____	_____



DECLARATION OF CONFORMITY CE **DECLARACIÓN DE CONFORMIDAD CE**

The Company *La empresa:*

Name *Nombre:* **POWER ELECTRONICS ESPAÑA, S.L.**
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Fax: +34 96 131 82 01

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Variadores de velocidad para motores AC

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Se halla en conformidad con las siguientes Directivas Europeas:

Reference <i>Referencia</i>	Title <i>Título</i>
2014/30/UE	Electromagnetic Compatibility <i>Compatibilidad Electromagnética</i>
2014/35/UE	Electrical Material intended to be used with certain limits of voltage. <i>Material Eléctrico para su utilización con determinados límites de tensión (Baja tensión)</i>

References of the harmonized technical norms applied under the Electromagnetic Compatibility Directive:

Referencias de las normas técnicas armonizadas aplicadas bajo la Directiva de Compatibilidad Electromagnética:

Reference <i>Referencia</i>	Title <i>Título</i>
IEC 61800-3:2004	Adjustable speed electrical power drive systems. Part 3: EMC requirements and specific test methods. <i>Accionamientos eléctricos de potencia de velocidad variable. Parte 3: Requisitos CEM y métodos de ensayo específicos.</i>

References of the harmonized technical norms applied under the Low Voltage Directive:

Referencias de las normas técnicas armonizadas aplicadas bajo la Directiva de Baja Tensión:

Reference <i>Referencia</i>	Title <i>Título</i>
IEC 61800-5-1:2007	Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy (IEC 61800-5-1:2007); <i>Accionamientos eléctricos de potencia de velocidad variable. Parte 5-1: Requisitos de seguridad. Eléctricos, térmicos y energéticos.</i>

Paterna, 10th of March, 2017

David Salvo
CEO



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